



Project Planning Document
(PPD)
(Rev.0)

Johnsonville Fossil Plant
North Drainage Culvert (TVA
Project ID 601939)
Cap Installation (TVA Project ID
605790)
Rock Buttrressing (TVA Project ID
605792)
New Johnsonville, Tennessee

Design with community in mind

Prepared for:
Tennessee Valley Authority
Chattanooga, Tennessee

April 2, 2014

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PPD RECORD OF REVISION

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New Johnsonville, Tennessee**

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TVA CONFIDENTIAL INFORMATION
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Johnsonville Fossil Plant
North Drainage Culvert (TVA Project ID 601939)
Cap Installation (TVA Project ID 605790)
Rock Buttrussing (TVA Project ID 605792)
New Johnsonville, Tennessee

1. Problem/Issue/Project Description

1.1. General

The Johnsonville Fossil Plant (JOF) is located in New Johnsonville, Tennessee, approximately 75 miles west of Nashville. The facility lies on the east bank of the Tennessee River at Tennessee River Mile (TRM) 99. **Figure 1** shows the location of JOF. An enlarged overview map is included in Attachment A.

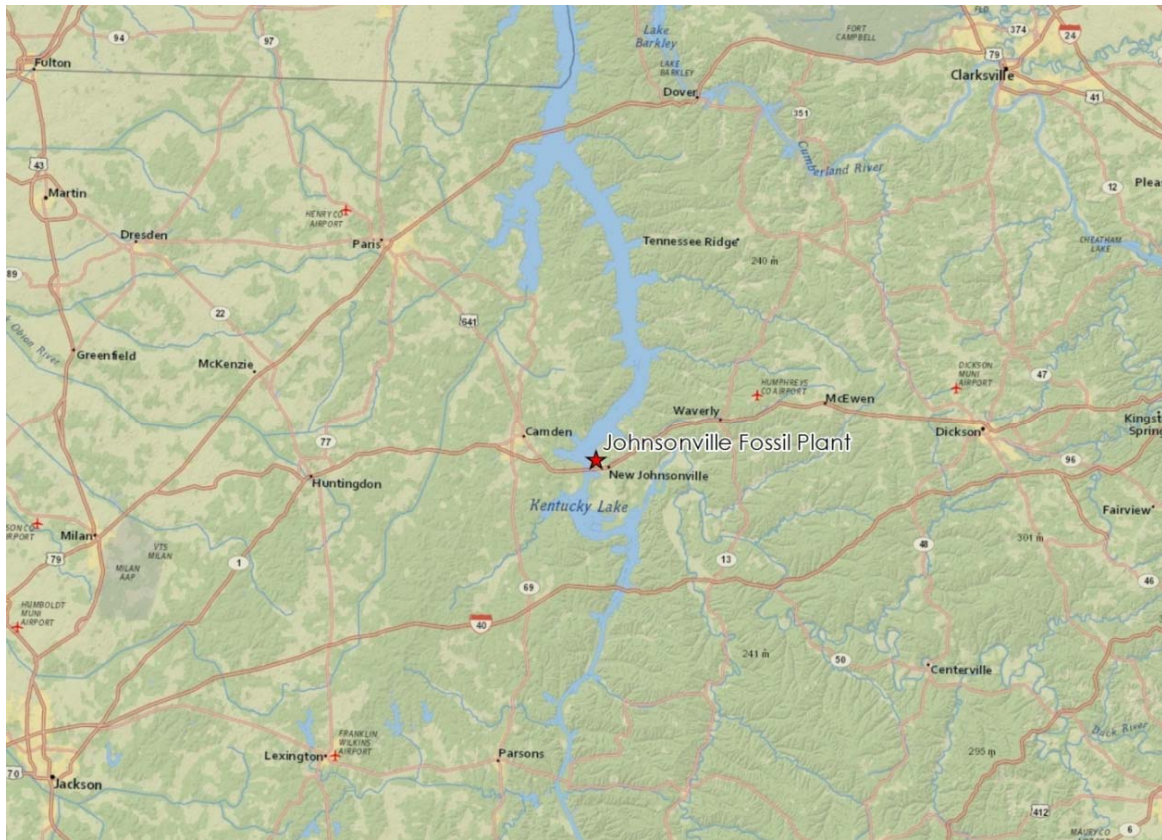


Figure 1. Vicinity Map

The Tennessee Valley Authority (TVA) plans to end coal-powered generation at JOF by December 31, 2017. When this occurs, the plant's coal-generation structures and infrastructure will be decommissioned and closed. Prior to these activities, TVA plans to address long-standing stormwater management, maintenance, and seepage and erosion

issues observed on TVA's portion of Ash Area No. 1. It will accomplish this through the construction of three capital construction projects: (1) North Drainage Culvert (TVA Project ID 601939), (2) Cap Installation (TVA Project ID 605790), and (3) Rock Buttrressing (TVA Project ID 605792).

1.2. Plant Background

JOF is the oldest coal-fired electric generation plant in TVA's system. Construction began in 1949 and the first coal-fired generating unit came online in 1951. When JOF began operations, all ash was sluiced to Ash Area No. 1. This remained the active sluice area until 1970. **Figure 2** provides a plant overview and shows the location of Ash Area No. 1.



Figure 2. Plant Overview Map

Ash Area No. 1 covers approximately 16 acres. It is bordered by DuPont's property line on the north; a poorly drained, area of ponded water on the east; an aboveground fuel oil pipeline on the south; and a dike on the west. The dike on the west extends approximately 1,000 feet along the Kentucky Lake shoreline at an elevation of approximately 381 feet. **Figure 3** shows the project site.



Figure 3. Project Site Overview Map

Efforts to reclaim the site following 1970 included the placement of clay on the site on more than one occasion; however, no formal cap was constructed. To lower the water table within the disposal area, a 36-inch culvert through the dike was constructed in the northwest corner that releases into the Tennessee River. The culvert has an inlet invert elevation of 370.9 feet on the west side of the dike and an outlet invert elevation of 367.7 feet on the east side of the dike.

Surface runoff from site generally flows to the perimeter. Slopes vary from less than 1% to greater than 50%. There are several flat areas throughout the site where water ponds and eventually infiltrates into the ground or evaporates.

Drainage ditches convey runoff along the northern and western edges of the site to the culvert. The northern drainage ditch conveys runoff from both within the disposal area and through drainage from areas upstream of the site, including the DuPont Dredge Cell. The western drainage ditch conveys runoff from within the disposal area and drains to the northern drainage ditch. Surface runoff from approximately 60 acres drains to the culvert through the dike.

2. Project Goals and Objectives

Objectives that apply to all three projects include: obtaining regulatory closure status from TDEC for Ash Area No. 1; facilitating future inspections and maintenance; limiting excavations into the residual material and thereby reduce the contractor's exposure; and executing the projects in accordance with the design criteria identified by the Joint Project Team (JPT) (Attachment H - Facility Exclusion Criteria).

Specific objectives identified for each project are listed below.

- North Drainage Culvert
 - Mitigate standing water.
 - Improve through drainage without increased headwater onto DuPont's site.
 - Replace existing damaged culvert through dike.
 - Address seeps occurring in the northern drainage channel.
 - Provide an improved sampling station for outfall (better access).
- Cap Installation
 - Cover existing areas of exposed ash.
 - Inhibit rainfall infiltration into the ash.
 - Provide vegetative cover.
 - Reduce the contribution of seeps attributed to rainfall infiltration.
- Rock Buttreassing
 - Provide erosion protection.
 - Provide a uniform transition from TVA's to DuPont's dike slope.
 - Improve the appearance of the dike from Kentucky Lake.

3. Alternate Solutions Considered

Alternatives for the three projects are described below. Conceptual drawings for the recommended solution for each of the three projects are included in Attachment C.

3.1. Alternative Evaluation Criteria

The alternatives were evaluated based on the criteria listed below. The results of the evaluation were used to determine the recommended alternatives. The evaluation criteria used in this analysis are:

- Meeting project objectives.
- Construction Cost – Conceptual cost opinions are in Appendix B.
- Constructability – The ease or difficulty of implementing an alternative.
- Maintenance cost.

3.2. Alternative 1 – North Drainage Culvert

Three alternatives were considered for conveying stormwater runoff to the dike. All three involve site preparation, fill placement (grade to drain) in the area of ponded water east of the site, and improvements to the existing drainage channel on the north side of the site. Four alternatives were considered for conveying stormwater runoff through the dike.

The alternatives considered for conveying stormwater runoff to the dike are:

1. Alternative A.1.a – Open channel lined with an articulated concrete block system.
2. Alternative A.1.b – Open channel lined with grouted riprap.
3. Alternative A.2 – 42-inch HDPE butt-fused pipe with a grass-lined open channel over the pipe.

The alternatives considered for conveying stormwater runoff through the dike are:

1. Alternative B.1 – Open channel through the dike.
2. Alternative B.2 – Existing damaged culvert replaced with 42-inch HDPE butt-fused pipe.
3. Alternative B.3.a – 42-inch HDPE butt-fused pipe installed through a steel casing adjacent to existing culvert using auger boring; existing culvert abandoned in place.
4. Alternative B.3.b – 42-inch HDPE butt-fused pipe installed through a steel casing adjacent to existing culvert using microtunneling; existing culvert abandoned in place.

A detailed description of each alternative is provided below.

3.2.1. North Drainage Culvert – Alternative A.1.a

Minor grading in the northern channel will address low spots and prepare the subgrade for placement of a geosynthetic cap system. While onsite drainage and through drainage will be conveyed through the open channel, seepage caused from groundwater will be mitigated from surfacing in the channel by the construction of a low permeability cap system. Articulated concrete block mats will be placed above the cap system.

3.2.2. North Drainage Culvert – Alternative A.1.b

Minor grading in the northern channel will address low spots and prepare the subgrade for placement of a geosynthetic cap system. While onsite drainage and through drainage will be conveyed through the open channel, seepage caused from groundwater will be mitigated from surfacing in the channel by the construction of a low permeability cap system. Grouted riprap will be placed above the geomembrane.

3.2.3. North Drainage Culvert – Alternative A.2 (Recommended Solution)

Minor grading in the northern channel will prepare the subgrade for placement of a culvert. A crushed stone bedding course will be placed and a 42-inch HDPE butt-fused pipe will be installed. The butt-fusion process will seal the pipe joints and inhibit leakage or groundwater infiltration. Backfill will be placed in the channel and a grass-lined drainage swale will be constructed above the pipe. Stormwater inlets will be installed along the pipe.

A hydrologic/hydraulic analysis was performed on the system to compare existing conditions versus proposed conditions to assess the potential impact to DuPont. The analysis assessed both 25-year and 100-year conditions. The results of this analysis showed that the 42-inch HDPE would reach capacity for both the 25-year and the 100-year events and the drainage swale would be utilized to handle the overflow, however, the models indicated that the headwaters would not cause water to overflow the channel along DuPont. Additional analysis will be performed in the Phase 2 design including velocity comparisons to assess if erosion protection measures will be required within the channel.

Since the pipe will be overtopped by through drainage, flow will be conveyed through both the pipe and the open channel to Kentucky Lake. A concrete headwall will be constructed at the inlet of the pipe in order to accommodate overtopping of the culvert and permit flow to enter the channel.

3.2.4. North Drainage Culvert – Alternative B.1

The dike will be excavated to remove the existing culvert and to form a trapezoidal open channel at the location of the existing culvert. Material removed from the dike will remain onsite and be used as fill material. The open channel through the dike will be lined with grouted riprap. A sampling platform will be constructed at the outlet to Kentucky Lake and a stairway will be constructed to provide access to the sampling platform from the top of the dike.

3.2.5. North Drainage Culvert – Alternative B.2 (Recommended Solution)

The dike will be excavated at the location of the existing culvert. The existing culvert will be removed and replaced with a 42-inch HDPE butt-fused pipe. Material removed from the dike will remain onsite and be used as fill material. The dike will be reconstructed using fill from an off-site borrow source. An outlet headwall with a sampling station will be constructed for the pipe. A stairway will be constructed to provide access to the sampling platform from the top of the dike. An overflow channel lined with grouted riprap will be constructed through the dike to prevent stormwater overtopping and damaging the dike.

3.2.6. North Drainage Culvert – Alternative B.3.a

A 54-inch steel casing will be installed while advancing through the dike by auger boring. Material removed from the dike will remain onsite and be used as fill material. A 42-inch HDPE butt-fused pipe will be installed through the casing and the annulus will be filled with grout. An outlet headwall with a sampling station will be constructed for the pipe. A stairway will be constructed to provide access to the sampling platform from the top of the dike. The existing culvert will be abandoned in place by capping each end and filling it with grout. An overflow channel lined with grouted riprap will be constructed above the pipe to prevent stormwater overtopping and damaging the dike.

3.2.7. North Drainage Culvert – Alternative B.3.b

A microtunnel boring machine (MTBM) will be advanced through the dike and a 54-inch steel casing will be installed. Material removed from the dike will remain onsite and be used as fill material. A 42-inch HDPE butt-fused pipe will be installed through the casing and the annulus will be filled with grout. An outlet headwall with a sampling station will be constructed for the pipe. A stairway will be constructed to provide access to the sampling

platform from the top of the dike. The existing culvert will be abandoned in place by capping each end and filling with grout. An overflow channel lined with grouted riprap will be constructed above the pipe to prevent stormwater overtopping and damaging the dike.

Table 1. North Drainage Culvert Upstream of Dike Alternative Evaluation

Evaluation Criteria	Alternative A.1.a	Alternative A.1.b	Alternative A.2
Construction Cost (includes 30% contingency)	\$1,350,000	\$767,000	\$677,000
Achievement of Project Objectives	<ul style="list-style-type: none"> - Excavations into ash and contractor's exposure will be limited. - Inspections and maintenance will be made easier. - Standing water will be minimized. - Through drainage will be improved without increasing headwater onto DuPont's site. - Geomembrane will mitigate seeps surfacing in the channel. 	<ul style="list-style-type: none"> - Excavations into ash and contractor's exposure will be limited. - Inspections and maintenance will be made easier. - Standing water will be minimized. - Through drainage will be improved without increasing headwater onto DuPont's site. - Geomembrane will mitigate seeps surfacing in the channel. 	<ul style="list-style-type: none"> - Excavations into ash and contractor's exposure will be limited. - Inspections and maintenance will be made easier. - Standing water will be minimized. - Through drainage will be improved without increasing headwater onto DuPont's site. - Butt-fused pipe will inhibit leakage or groundwater infiltration and mitigate seeps.
Constructability	<ul style="list-style-type: none"> - No significant difficulties are anticipated. - Appropriate personal protective equipment should be used by contractor. - A temporary bypass pumping system will be required for diverting through drainage around the northern drainage channel during construction. 	<ul style="list-style-type: none"> - No significant difficulties are anticipated. - Appropriate personal protective equipment should be used by contractor. - A temporary bypass pumping system will be required for diverting through drainage around the northern drainage channel during construction. 	<ul style="list-style-type: none"> - No significant difficulties are anticipated. - Appropriate personal protective equipment should be used by contractor. - A temporary bypass pumping system will be required for diverting through drainage around the northern drainage channel during construction.
Maintenance Cost	<ul style="list-style-type: none"> - Regular inspections of the northern channel will be required to monitor for signs of instability or vegetation growth. 	<ul style="list-style-type: none"> - Regular inspections of the northern channel will be required to monitor for signs of instability or movement of the grouted riprap or vegetation growth. 	<ul style="list-style-type: none"> - Regular pipe inspection and cleaning will be required. - Regular cleaning of the inlets will be required.

Table 2. North Drainage Culvert Through Dike Alternative Evaluation

Evaluation Criteria	Alternative A.1.a	Alternative A.1.b	Alternative A.2
Construction Cost (includes 30% contingency)	\$80,000	\$110,000	\$330,000
Achievement of Project Objectives	<ul style="list-style-type: none"> - Excavation into dike will be required. However, limited excavation into ash is anticipated. - Inspections and maintenance will be made easier. - Through drainage will be improved without increasing headwater onto DuPont's site. - Existing damaged culvert will be replaced. - Improved sampling station will be provided. - Contractor exposure to dike material is limited due to use of heavy equipment 	<ul style="list-style-type: none"> - Excavation into dike will be required. However, limited excavation into ash is anticipated. - Inspections and maintenance will be made easier. - Through drainage will be improved without increasing headwater onto DuPont's site. - Existing damaged culvert will be replaced. - Improved sampling station will be provided. - Contractor exposure to dike material is limited due to use of heavy equipment 	<ul style="list-style-type: none"> - Inspections and maintenance will be made easier. - Through drainage will be improved without increasing headwater onto DuPont's site. - Existing damaged culvert will be replaced. - Improved sampling station will be provided. - Contractor exposure to spoils during construction likely.
Constructability	<ul style="list-style-type: none"> - No significant difficulties are anticipated. However, subsurface conditions are unknown. Materials that are difficult to excavate through or unstable materials may be present. - Appropriate personal protective equipment should be used by contractor. 	<ul style="list-style-type: none"> - No significant difficulties are anticipated. However, subsurface conditions are unknown. Materials that are difficult to excavate through or unstable materials may be present. - Appropriate personal protective equipment should be used by contractor. 	<ul style="list-style-type: none"> - Settlement may occur during construction. - Sufficient space is required for equipment and materials. - Appropriate personal protective equipment should be used by contractor.
Maintenance Cost	<ul style="list-style-type: none"> - Regular inspections will be required to monitor for signs of instability or erosion. 	<ul style="list-style-type: none"> - Regular pipe inspection and cleaning will be required. 	<ul style="list-style-type: none"> - Regular pipe inspection and cleaning will be required.

3.3. Cap Installation

Two alternatives were considered for the cap installation project. Both alternatives involve site preparation and fill placement (grade to drain) on the site; a stormwater management system consisting of overland flow and grass-lined swales to convey runoff; and placement of sod over the capped area.

The alternatives considered for cap installation are:

1. Alternative 1 – Install a cap consisting of a geomembrane and 24 inches of cover soil.
2. Alternative 2 – Install a cap consisting of a 24-inch compacted soil layer and 12 inches of cover soil.

A detailed description of each alternative is provided below.

3.3.1. Cap Installation – Alternative 1 (Recommended Solution)

A geotextile fabric will be placed on the prepared subgrade. Above this an LLDPE flexible geomembrane, a geocomposite drainage layer, 18 inches of cover soil, and a vegetative layer with a minimum thickness of 6 inches will be placed.

3.3.2. Cap Installation – Alternative 2

A 24-inch layer of low permeability soil will be placed on the prepared subgrade. Above this a vegetative layer with a minimum thickness of 12 inches will be placed.

Table 3. Cap Installation Alternative Evaluation

Evaluation Criteria	Alternative A.1.a	Alternative A.1.b	Alternative A.2
Construction Cost (includes 30% contingency)	\$3,800,000	\$4,300,000	Construction Cost (includes 30% contingency)
Achievement of Project Objectives	<ul style="list-style-type: none"> - Excavation into ash and contractor exposure is anticipated to be limited. - Inspections and maintenance will be made easier. - Areas of exposed ash will be covered. - Rainfall infiltration into the ash will be mitigated. - Vegetative cover will be established. - Contribution of seeps attributed to rainfall infiltration will be reduced. 	<ul style="list-style-type: none"> - Excavation into ash and contractor exposure is anticipated to be limited. - Inspections and maintenance will be made easier. - Areas of exposed ash will be covered. - Rainfall infiltration into the ash will be mitigated. - Vegetative cover will be established. - Contribution of seeps attributed to rainfall infiltration will be reduced. 	Achievement of Project Objectives
Constructability	<ul style="list-style-type: none"> - No significant difficulties are anticipated. However, subsurface conditions are unknown and unstable materials may be present. Stabilization of soft ash/subgrade may be required during construction. - Appropriate personal protective equipment should be used by contractor. 	<ul style="list-style-type: none"> - No significant difficulties are anticipated. However, subsurface conditions are unknown and unstable materials may be present. Stabilization of soft ash/subgrade may be required during construction. - Appropriate personal protective equipment should be used by contractor. 	Constructability
Maintenance Cost	<ul style="list-style-type: none"> - Regular inspections will be required to monitor the cap and drainage swales for signs of instability or erosion. - Regular mowing of the site will be required. 	<ul style="list-style-type: none"> - Regular inspections will be required to monitor the cap and drainage swales for signs of instability or erosion. - Regular mowing of the site will be required. 	Maintenance Cost

3.4. Rock Buttreassing

Two alternatives were considered for the rock buttressing project. Both alternatives involve removal of the existing fence along the crown of the dike to permit construction, site preparation, construction of a graded filter with a geomembrane, and construction of a replacement fence. The graded filter will extend from approximately the normal summer pool elevation of Kentucky Lake to elevation 375. From bottom to top, the graded filter will consist of ± 12 inches of no. 57 stone, a geotextile cushion, an LLDPE flexible geomembrane, a geotextile cushion, and 6 inches of no. 57 stone. Either riprap or a vegetative layer will be placed atop the graded filter and will extend from the summer pool elevation of Kentucky Lake to elevation 381.

The alternatives considered for the rock buttressing project are:

1. Alternative 1 – Graded filter with riprap cover layer extending to top of dike.
2. Alternative 2 – Graded filter with vegetated cover layer extending to top of dike.

3.4.1. Rock Buttreassing – Alternative 1 (Recommended Solution)

A riprap layer will be placed atop the graded filter. This riprap layer will extend from the normal summer pool elevation of Kentucky Lake to elevation 381.

3.4.2. Rock Buttreassing – Alternative 2

A riprap layer will be placed atop the graded filter on the lower portion of the dike. The riprap layer will extend from approximately the summer pool elevation of Kentucky Lake to an elevation 362. A vegetative layer will be placed atop the graded filter from elevation 362 to elevation 381. Sod will be placed on the vegetated layer.

Table 4. Rock Buttrressing Alternative Evaluation

Evaluation Criteria	Alternative 1	Alternative 2
Cost (includes 30% contingency)	\$1,000,000	\$800,000
Achievement of Project Objectives	<ul style="list-style-type: none"> - Excavation into ash and contractor exposure is anticipated to be limited. - Inspections and maintenance will be made easier. - Erosion protection will be provided. - A uniform transition from TVA's to DuPont's dike slope will be provided. - Appearance of the dike from Kentucky Lake will be improved. 	<ul style="list-style-type: none"> - Excavation into ash and contractor exposure is anticipated to be limited. - Inspections will be made easier. However, additional maintenance will be required to maintain vegetation. - Erosion protection will be provided. - A uniform transition from TVA's to DuPont's dike slope will be provided. - Appearance of the dike from Kentucky Lake will be improved.
Constructability	<ul style="list-style-type: none"> - No significant difficulties are anticipated. However, subsurface conditions are unknown and unstable materials may be present. Stabilization of subgrade may be required during construction. 	<ul style="list-style-type: none"> - No significant difficulties are anticipated. However, subsurface conditions are unknown and unstable materials may be present. Stabilization of subgrade may be required during construction.
Maintenance Cost	<ul style="list-style-type: none"> - Regular inspections will be required to monitor the embankment for displacement or degradation of riprap. 	<ul style="list-style-type: none"> - Regular inspections will be required to monitor the embankment for displacement or degradation of riprap. - The vegetative layer will need to be mowed and inspected regularly for signs of erosion or instability.

4. Recommended Design Solution

Stantec recommends that TVA select Alternative A.2 upstream of dike and Alternative B.2 through the dike for the North Drainage Culvert project, Alternative 1 for the Cap Installation project, and Alternative 1 for the Cap Installation project. The scopes of the recommended design solutions are described in the following paragraphs. The solutions are also illustrated on the conceptual drawings presented in Appendix A.

4.1. North Drainage Culvert

The recommended design solution for the North Drainage Culvert project is Alternative A.2 upstream of dike and Alternative B.2 through the dike.

Compared to the other alternatives considered upstream of the dike, Alternative A.2:

- Meets the project goals and objectives.
- Provides the least expensive alternative.
- Allows more work within the confines of equipment outside of the swale.
- Allows for one time disturbance for the swale versus redisturbing the area when the cap is placed.

Compared to the other alternatives considered through the dike, Alternative B.2:

- Meets the project goals and objectives.
- Provides one of the less expensive alternatives.
- Allows for a consistent transition with Alternative A.1.
- Creates fewer complications with site security.
- Less erosion potential.

4.2. Cap Installation

The recommended design solution for the Cap Installation project is Alternative 1. Compared to the other alternative considered, Alternative 1:

- Meets the project goals and objectives.
- Adheres to an established and approved regulatory process
- Materials are readily available.

4.3. Rock Buttressing

The recommended design solution for the Rock Buttressing project is Alternative 1. Compared to the other alternative considered, Alternative 1:

- The alternative meets the project goals and objectives.
- Requires less maintenance post construction.

5. Assumptions/Limitations/Risks/Critical Success Factors

The recommended design solution has been developed around certain assumptions, limitations, and identified risks. The following unverified assumptions, limitations, and risks are recognized for the project.

5.1. Assumptions/Limitations

- Engineering and construction efforts will be in accordance with the design criteria established by the JPT during Phase 1, which is outlined in Attachment H. Where specific criteria have not yet been established, the design will follow recognized guidelines developed by TVA, USACE, NRCS, or NAVFAC and will be further refined by the JPT in Phase 2.
- Additional surveying requested by Stantec will be provided by TVA.
- Review of project documentation by TVA and Stantec will be timely.
- Environmental concerns and permit obligations will be addressed by TVA.
- No industrial waste or residuals or hazardous or environmentally sensitive materials other than coal combustion byproducts will be encountered during construction.

5.2. Risks

A risk matrix for the three projects has been prepared and is provided in Attachment D.

5.3. Critical Success Factors

The following measures are considered potentially critical to the success of the project. If not dealt with appropriately, the project goals and objectives may not be accomplished.

- If the contractor and/or his subcontractors fail to follow the plans and specifications, the quality of work could be compromised and/or the project completion date delayed.
- If the contractor and/or his subcontractors fail to report field conditions which are significantly different from the plans (e.g., unknown buried pipes, bedrock), the constructability/ implementability of the project could be compromised and/or the project delayed.

The following measures, when implemented, will help to mitigate the previously mentioned actions and could be critical to the successful completion of the project.

- Open communication between TVA Capital Projects, Routine Operation and Handling, Environmental, and Stantec.
- Comprehensive observation and engineering oversight of the construction and adherence to the quality control processes.

6. Environmental/Operational Impacts

There are no identified JOF operational impacts. Environmental/permitting needs that have been identified with respect to the proposed project are identified as follows:

- **Closure Plan** – A closure plan for Ash Area No. 1 will be prepared and submitted to TDEC. This plan will outline the proposed alternates for drainage improvements and the addition of cover, as well as quality assurance and quality control measures.
- **Notice of Intent (NOI) and Stormwater Pollution Prevention Plan (SWPPP) for the Construction Permit** – Because there is potential that more than one acre will be disturbed during the construction activities, a stormwater NOI to discharge runoff associated with construction activities will be submitted to TDEC Department Water Pollution Control (DWPC) for the NPDES construction. Applicants must submit the following information for a Stormwater Construction Permit:
 - A completed and signed NOI for Construction Activity – Stormwater Discharges. The NOI must include a map on 8.5-inch by 11-inch paper with boundaries 1 to 2 miles outside the site property with the site and construction area outlined and the receiving water or receiving storm sewer highlighted and identified. It is preferable for this map to be the appropriate portion of a USGS 7.5-minute quadrangle map.
 - A site-specific SWPPP must be developed and submitted as required by the NOI along with applicable permit fees. The SWPPP must be developed, implemented, and updated according to Part 3 of the Construction General Permit (CGP).
 - Erosion and sediment control measures shall be included with the design drawings to ensure that sediment due to land disturbance activities is retained onsite.
 - A Notice of Termination (NOT) to terminate the stormwater construction permit will be submitted upon completion of the project.
- **Categorical Exclusion Checklist (CEC)** – This TVA-required document must be completed for all proposed actions at TVA facilities. A CEC will be completed by TVA for the project.
- **ARAP/401/404 Permits** – Physical alterations to streams, river, lakes, and wetlands, such as what may be implemented as part of the Rock Buttrressing project, require Aquatic Resource Alteration Permits (ARAPs) and 401 Water Quality Certification. If the project should involve the addition of fill materials into the waters of the U.S., a 404 permit will be required.

7. Key Deliverables

The following is a list of the primary deliverable items.

- Phase 1 – Planning and 10% Conceptual Design
 - 10% Conceptual Design Plans
 - Project Planning Document
 - Stantec Phase 2 Planning Document (Scope of Work and Fee Estimate)
- Phase 2 – Design Engineering Services
 - Issued for Review (IFR) plans (60%, and 95%)
 - Issued for Construction (IFC) plans (100%)
 - Technical Specifications
 - Design Report Calculations
 - Basis of Design Report
 - Opinion of Probable Construction Cost
 - SWPPP
 - USACE Nationwide Permit (if required)
 - Construction QA/QC Plan
- Phase 3 – Construction
 - Daily Construction Observation Field Reports and Quality Control Tests
 - Construction Certification Report
 - Records Drawings
 - Project Closeout Documents

8. Construction Materials/Contracts

8.1. Construction Materials

Construction materials for the project will consist of readily available materials such as vegetative soil, low permeable soil, riprap, coarse aggregate, and grout. Other specialty materials include HDPE drainage piping, precast drainage structures, and geotextile and geomembrane materials. Anticipated project materials have been identified in the conceptual design drawings and will be further characterized in the project specifications during the design phase.

8.2. Contracts

TVA will utilize their own construction capabilities, use a contractor already on site, or issue a Request for Proposal (RFP) to accomplish the work. The decision on who will perform the work will be made by TVA.

8.3. Procurement of Equipment and Materials

While non-standard HDPE pipe and/or structures have the potential for long lead times, the current design is not expected to require lengthy procurement times. TVA will decide whether to procure equipment and materials or to include those items in the RFP.

9. Cost Estimate

Stantec has prepared opinions of probable cost of construction for each alternative presented in Section 3. An expanded construction cost spreadsheet is included in Attachment D. Costs are considered preliminary and are subject to change as new information is obtained.

Stantec's detailed fee estimate for engineering support is presented in Attachment E. The monthly cash flow for this project, including construction and engineering services, is presented in Attachment F.

10. Schedule

Stantec has developed an estimated schedule for the implementation of the complete scope of work (i.e., design and construction). The engineering and conceptual construction schedule is presented in Attachment G. The construction schedule is preliminary in nature and implementation will be the responsibility of the Contractor.

11. Drawings/Sketches

11.1. Conceptual Drawings

Separate sets of conceptual drawings have been prepared for the three projects. They are included in Attachment B.

11.2. Design Drawings

It is anticipated that the project will consist of the following drawings. Early progressive submittals will contain reduced or partial sets as appropriate. The CQA Plan and Specifications may also be included as part of the IFC submittal.

- Cover Sheet
- General Notes
- Existing Conditions/Demolition Plan/Erosion Control
- Stormwater Management Plan
- Site Layouts
- Grading Plans
- Plan and Profile
- Erosion and Sediment Control Plan
- Sections
- Details

11.3. TVA Drawings to be Affected

The following existing TVA drawings could be impacted due to revision or replacement. Note that this may not be a comprehensive list of affected drawings. Additional drawings may be added to this list during the Phase 2 detailed design.

- TVA Drawing: 10H443, R1 (1/4/1973)
- TVA Drawing: 10H515, R0 (7/6/1954)
- TVA Drawing: 10H516, R0 (7/6/1954)
- TVA Drawing: 10H517, R0 (7/6/1954)
- TVA Drawing: 10H518, R0 (7/6/1954)
- TVA Drawing: 10H519, R0 (11/15/1954)

12. References

The following references were used in evaluating and preparing the Project Planning Document.

- Limited Phase I Environmental Site Assessment of Johnsonville Fossil Plan Pond A, HDR, September 2013.
- Property Document Review Ash Disposal Area No. 1, Stantec Consulting Services, Inc., November 2011.

13. Attachments

The following documents are provided with Project Planning Document for additional reference.

Attachment A	Enlarged Overview Map
Attachment B	Preliminary Conceptual (10%) Design Drawings
Attachment C	Risk Matrix
Attachment D	Preliminary Construction Cost Opinion
Attachment E	Stantec Fee Estimate Derivation
Attachment F	Monthly Cash Flow
Attachment G	Schedule
Attachment H	Facility Exclusion Criteria (i.e. Closure Design Checklist)

Attachment A

Enlarged Overview Map



Figure No.
1

Title
**Site Overview
Johnsonville Fossil Plant
Johnsonville, Humphreys County, Tennessee**

Client/Project
Tennessee Valley Authority
Ash Disposal Areas Report
Johnsonville Fossil Plant

Project Location:
36° 1' 42.52" N, 87° 59' 10.42" W
Humphreys County, Tennessee

Prepared by wsw on 2014-01-14
Technical Review by tr on 2014-01-14
Independent Review by mt on 2014-01-14
Project No. 175553019

0 0.25 0.5 Miles
1:15,840 (At Original document size of 11x17)



Notes
1. Coordinate System: NAD 1927 StatePlane Tennessee FIPS 4100
2. Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Attachment B

Preliminary Conceptual
(10%) Design Drawings

GENERAL NOTES

1. THESE DRAWINGS WERE PREPARED BY STANTEC CONSULTING SERVICES INC. (STANTEC) USING TOPOGRAPHIC INFORMATION PROVIDED BY TVA DATED APRIL 2012 AND DECEMBER 2013. ACTUAL CONDITIONS MAY VARY FROM THOSE SHOWN ON THESE DRAWINGS AND SHOULD BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. DEFINITIONS: WHENEVER THE FOLLOWING TERMS ARE USED IN THESE PLANS FOR CONSTRUCTION, IT IS UNDERSTOOD THAT THEY REPRESENT THE FOLLOWING:

CONTRACTOR: ENTITY RESPONSIBLE FOR CONSTRUCTION.

ENGINEER: STANTEC CONSULTING SERVICES INC. (STANTEC)

OWNER: TENNESSEE VALLEY AUTHORITY (TVA) – JOHNSONVILLE FOSSIL PLANT (JOF)

TDOT: TENNESSEE DEPARTMENT OF TRANSPORTATION AND SPECIFICALLY REFERENCES THE "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", CURRENT EDITION. ANY MATERIAL DESIGNATED AS "TDOT" IS TO CONFORM TO THE MATERIAL STANDARDS NOTED AND PLACEMENT/INSTALLATION METHODOLOGY SPECIFIED IN THE CURRENT EDITION OF THE "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN: REFERS TO A DOCUMENT THAT ESTABLISHES MINIMUM QUALITY ASSURANCE REQUIREMENTS, TESTING FREQUENCY AND QUALITY OVERSIGHT RESPONSIBILITY.

QUALITY ASSURANCE (QA) MANAGER: A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF TENNESSEE THAT IS RESPONSIBLE FOR THE QUALITY OF THE CONSTRUCTED PROJECT AS DEFINED IN THE CQA PLAN. THE QA TEAM CONSISTS OF QUALIFIED PERSONNEL THAT WORK UNDER THE DIRECT SUPERVISION OF THE QA MANAGER. QA TEAM PERSONNEL ARE INDIVIDUALS THAT ARE FAMILIAR WITH THE MATERIALS UTILIZED AND THE CONSTRUCTION COMPONENTS.
3. WHENEVER REFERENCE IS MADE TO TENNESSEE DEPARTMENT OF TRANSPORTATION (TDOT) STANDARD SPECIFICATIONS, THE AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM), AMERICAN CONCRETE INSTITUTE (ACI), OR OTHER PUBLISHED STANDARDS OR SPECIFICATIONS, IT SHALL MEAN THE LATEST VERSION IN ITS ENTIRETY.
4. THESE PLANS FOR CONSTRUCTION, ALONG WITH THE TECHNICAL SPECIFICATIONS, CQA PLAN, AND OTHER REFERENCED DOCUMENTS OR STANDARDS, SHALL CONSTITUTE THE COMPLETE CONSTRUCTION DOCUMENTS FOR THIS PROJECT.
5. THE CONTRACTOR SHALL COMMUNICATE CONSTRUCTABILITY ISSUES, DISCREPANCIES IN THE PLANS FOR CONSTRUCTION OR SPECIFICATIONS, ETC., TO THE QA MANAGER AND OWNER IMMEDIATELY UPON BECOMING AWARE. THE CONTRACTOR SHALL USE THE OWNER'S REQUEST FOR INFORMATION (RFI) FORM THAT IS CONTAINED IN THE CQA PLAN TO COMMUNICATE AND ESTABLISH WRITTEN DOCUMENTATION OF THE ISSUE AND ITS RESOLUTION.
6. THE CONTRACTOR SHALL KEEP A RECORD OF ALL DEVIATIONS IN LOCATION, ELEVATION, METHOD, OR MATERIAL USED FROM THAT SHOWN ON THESE PLANS. AT COMPLETION OF THE PROJECT A PLAN SET OF FINAL RECORD DRAWINGS SHALL BE PREPARED BY THE ENGINEER TO ENSURE THAT TVA HAS A PERMANENT RECORD OF THE PROJECT AS IT WAS CONSTRUCTED. THE CONTRACTOR SHALL COOPERATE FULLY BY PROVIDING HIS RECORD OF DEVIATIONS, AND SHALL ASSIST WITH PREPARATION OF THE FINAL RECORD DRAWINGS.
7. CONSTRUCTION ACTIVITIES SHALL BE OBSERVED BY THE QA MANAGER OR THE DESIGNATED REPRESENTATIVE ON THE QA TEAM. THE CONTRACTOR SHALL COORDINATE WITH THE ONSITE QA REPRESENTATIVE AND INFORM THE REPRESENTATIVE OF THE CONTRACTOR'S SCHEDULED WORK SHIFTS TO INSURE THAT QC REPRESENTATION OCCURS AS REQUIRED.
8. MATERIAL DELIVERIES AND HAULING FOR THIS PROJECT SHALL NOT BE PERMITTED DURING THE HOURS OF NORMAL PLANT SHIFT CHANGE (6:30 TO 7:00 A.M. AND 3:30 TO 3:45 P.M.)
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR HEALTH AND SAFETY OF ITS PERSONNEL AND SHALL MEET INDUSTRY STANDARD REQUIREMENTS. THE CONTRACTOR SHALL ADHERE TO THE OWNER'S REQUIREMENTS FOR SAFETY DURING CONSTRUCTION.
10. THE CONTRACTOR SHALL COORDINATE WITH TVA TO LOCATE AND VERIFY ALL UTILITIES PRIOR TO COMMENCING WORK TO ENSURE THERE SHALL BE NO CONFLICT WITH THE IMPROVEMENTS PRESENTED HEREIN. ONSITE UTILITIES AND UNDERGROUND FACILITIES, WHETHER SHOWN ON THE PLANS OR NOT, SHALL BE PROTECTED BY THE CONTRACTOR FROM DAMAGE BY THE CONTRACTOR'S OPERATIONS. IF DAMAGE OCCURS THE CONTRACTOR SHALL COORDINATE REPAIRS WITH THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE THAT OCCURS.
11. EXISTING GEOTECHNICAL INSTRUMENTATION (PIEZOMETERS AND SLOPE INCLINOMETERS) IS SHOWN ON THE PLANS FOR CONSTRUCTION. THE CONTRACTOR SHALL PROTECT THIS INSTRUMENTATION FROM DAMAGE. THIS INSTRUMENTATION SHALL BE REMOVED AND HANDED OVER TO THE OWNER DURING THE COURSE OF THE WORK IF NEEDED.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF ALL ACCESS ROADS, STAGING AREAS AND STORAGE AREAS USED DURING CONSTRUCTION, AND SHALL RESTORE SAID AREAS TO THEIR ORIGINAL CONDITION, OR BETTER, ONCE CONSTRUCTION IS COMPLETE UNLESS THE OWNER GIVES WRITTEN PERMISSION TO THE CONTRACTOR TO RETAIN THE AREA "AS IS."
13. VEGETATIVE AND ORGANIC MATERIALS SHALL BE REMOVED AS DESCRIBED IN THE SPECIFICATIONS.
14. ALL PIPE REMOVAL AND TRENCHING SHALL BE CONDUCTED IN STRICT ACCORDANCE WITH APPLICABLE TVA PROCESS AND PROCEDURE REQUIREMENTS.
15. PROPOSED STAGING AND STOCKPILE STORAGE AREAS ARE SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER (TVA) REGARDING USE OF THESE AREAS, AND OF ANY OTHER LOCATIONS PROPOSED BY THE CONTRACTOR. STAGING AND STOCKPILE STORAGE AREAS SHALL BE APPROVED BY THE OWNER.

16. STOCKPILES SHALL BE GRADED TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES. THE SIDE SLOPES SHALL HAVE MAXIMUM 3H:1V SLOPE. THE TOP OF THE STOCKPILE SHALL HAVE A MINIMUM TWO PERCENT SLOPE. MATERIALS SHALL BE SEGREGATED AS DIRECTED BY THE QC MANAGER.
17. FINAL EMBANKMENT SURFACES SHALL BE FINISHED TO A RELATIVELY SMOOTH AND COMPACT SURFACE. CONTRACTOR SHALL REVEGETATE SLOPE WITH SOD.

SOD SHALL BE PLACED AS SHOWN ON THESE PLANS FOR CONSTRUCTION AND SHALL BE IN ACCORDANCE WITH THE TENNESSEE EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.
18. GEOTEXTILES USED FOR CONSTRUCTION SHALL BE CERTIFIED BY THE MANUFACTURER AS CONFORMING TO THE PROJECT REQUIREMENTS. GEOTEXTILES SHALL NOT BE UTILIZED AS A FILTER UNLESS APPROVED BY TVA. IT MAY BE USED AS A TEMPORARY MEASURE AND REMOVED.
19. ALL SURFACES SHALL BE APPROVED BY THE QA MANAGER OR THE DESIGNATED REPRESENTATIVE ON THE QA TEAM PRIOR TO EMBANKMENT OR LINEAR CONSTRUCTION.
20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION SURVEYOR SELECTION AND COORDINATION OF ALL CONSTRUCTION RELATED SURVEYING. ALL ESTABLISHED TVA BENCH MARKS OR OTHER MONUMENTS SHALL BE PRESERVED AND PROTECTED. ANY ESTABLISHED MARKER OR BENCHMARK THAT IS DAMAGED BY CONSTRUCTION ACTIVITIES SHALL BE REPLACED BY TVA SURVEYING SERVICES AT THE CONTRACTOR'S EXPENSE.

EROSION PREVENTION AND SEDIMENT CONTROL (EPSC)

1. THE CONTRACTOR SHALL EXERCISE EVERY REASONABLE PRECAUTION AT ALL TIMES TO MINIMIZE SOIL EROSION AND PREVENT WATER POLLUTION BY DEPOSITION OF SEDIMENT INTO THE ADJACENT WATERWAYS. SOIL EROSION AND SEDIMENT CONTROLS MUST BE USED AND MAINTAINED IN EFFECTIVE OPERATING CONDITION DURING CONSTRUCTION, AND EXPOSED SOIL AND OTHER FILL MUST BE PERMANENTLY STABILIZED AT THE EARLIEST PRACTICABLE DATE.
2. SILT FENCES SHALL BE INSTALLED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES IN ANY AREA WHERE THEY ARE SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL INSPECT THE SILT FENCE FOR DAMAGE AND SEDIMENT BUILDUP EVERY 7 DAYS AND WITHIN 24 HOURS OF A PRECIPITATION EVENT THAT PRODUCES 1/2-INCH OR MORE OF RAINFALL. IF THE FENCE FABRIC IS UNDERMINED, TORN, OR IN ANY WAY BECOMES INEFFECTIVE, IT SHALL BE IMMEDIATELY REPAIRED OR REPLACED BY THE CONTRACTOR. SILT FENCES REMOVED TO PROVIDE ACCESS FOR EQUIPMENT AND VEHICLES SHALL BE REPLACED AT THE END OF THE WORK DAY.
3. ROCK BERMS SHALL BE CONSTRUCTED OF QUARRIED CRUSHED STONE PRIOR TO PERFORMING ANY EXCAVATION OR PIPE REMOVAL ACTIVITIES BELOW THE WATER LEVEL OF KENTUCKY LAKE. ROCK BERMS ARE CONSIDERED TEMPORARY FILLS AND SHALL BE REMOVED TO THE APPROXIMATE PRE-CONSTRUCTION ELEVATIONS.
4. THE CONTRACTOR SHALL ALSO EXERCISE EVERY PRECAUTION AT ALL TIMES TO PREVENT WATER POLLUTION BY NON-STORMWATER DISCHARGES, INCLUDING SPILLS OR RELEASES OF HAZARDOUS MATERIALS.
5. THE CONTRACTOR IS RESPONSIBLE FOR SITE DRAINAGE THROUGHOUT CONSTRUCTION AND SHALL INSTALL TEMPORARY DRAINAGE STRUCTURES OR PUMP WATER AS NECESSARY TO PREVENT INTERFERENCE WITH THE WORK. SUCH TEMPORARY DRAINAGE FEATURES SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF ENVIRONMENTAL PERMITS AND THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP). THE CONTRACTOR SHALL PREPARE A PLAN AND ISSUE TO THE CQA MANAGER FOR REVIEW AND APPROVAL PRIOR TO IMPLEMENTATION.
6. MATERIALS DELIVERED FOR INCORPORATION INTO THE WORK SHALL BE TEMPORARILY STORED IN AREAS SELECTED BY THE CONTRACTOR AND APPROVED BY THE OWNER. MATERIALS SHALL BE STORED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
7. THE EROSION AND SEDIMENT CONTROL MEASURES SHOWN SHALL BE CONSIDERED THE MINIMUM; SUPPLEMENTAL MEASURES SHALL BE PROVIDED BY THE CONTRACTOR AS FIELD CONDITIONS DICTATE.
8. DURING CONSTRUCTION, THE CONTRACTOR SHALL INSPECT, CLEAN, AND MAINTAIN ALL SEDIMENT CONTROL DEVICES AS SHOWN ON THE PLANS FOR CONSTRUCTION AND PROVIDE REPORTING AS REQUIRED BY THE SPECIFICATIONS AND REGULATIONS ON SAID ITEMS.
9. THE CONTRACTOR SHALL CONTROL FUGITIVE DUST EMISSIONS DURING CONSTRUCTION IN SUCH A MANNER AS TO COMPLY WITH APPLICABLE REGULATIONS. DUST CONTROL MEASURES SHALL BE SUBJECT TO APPROVAL OF THE QA MANAGER AND THE OWNER.
10. SOIL STOCKPILES THAT WILL NOT BE DISTURBED FOR 14 DAYS OR MORE SHALL BE TEMPORARILY SEEDED WITH WHEAT OR RYE AT A RATE OF 60 LBS/ACRE AND SHALL BE COVERED WITH MULCH.

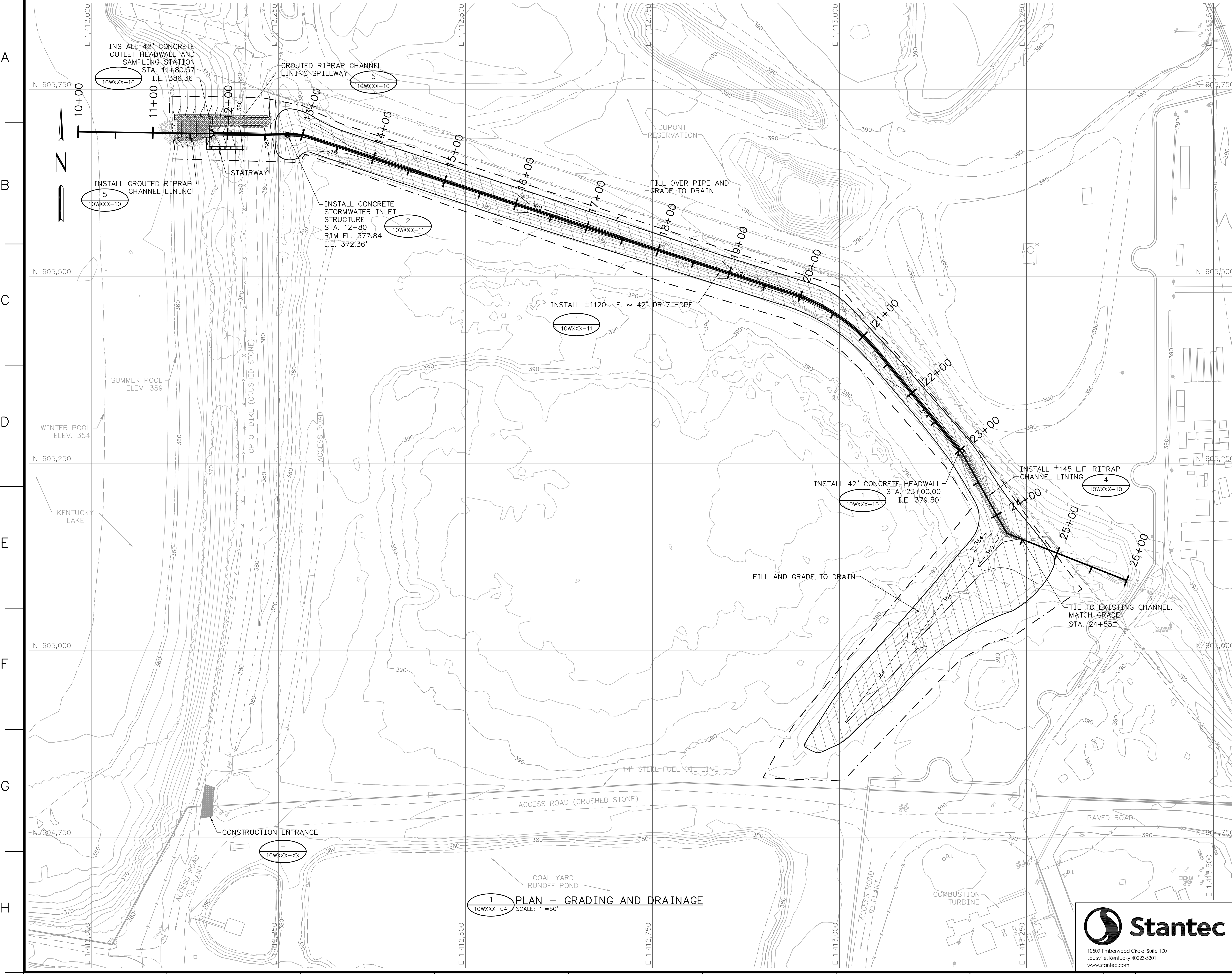
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NOT FOR CONSTRUCTION



SEE XXWXXX-XXX FOR LIST OF DESIGN, COMPANION, REFERENCE DRAWINGS AND SUPPORTING DESIGN CALCULATIONS NUMBER.

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R A 03/05/14 JES RRP MGV ALV SHB MST JCK - - -											
ISSUED FOR REVIEW											
REV. NO.	DATE	DSGN	DRWN	CHGD	SUPV	RWVD	APPD	ISSD	PROJECT ID	AS CONST	REV
SCALE: NONE EXCEPT AS NOTED											
YARD											
ASH AREA NO. 1											
ASH AREA NO. 1											
NORTH DRAINAGE CULVERT											
GENERAL NOTES											
DESIGNED BY: J.E. SPALDING	DRAWN BY: R.R. PETTY	CHECKED BY: M.C. VAUGHAN	SUPERVISED BY: A.L. VANCE	REVIEWED BY: S.H. BICKEL	APPROVED BY: M.S. TURNBOW	ISSUED BY: J.C. KAMMEYER					
JOHNSONVILLE FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING											
AUTOCAD R 2000		DATE 03/05/14	30	C	10WXXX-02				R A		

STANTEC	A
TASK COMPLETED BY:	REV NO.



SURVEY CONTROL NOTE:
A GLOBAL POSITIONING SYSTEM (GPS) BASE STATION HAS BEEN ESTABLISHED AND TRANSFORMATION PARAMETERS DETERMINED BY TVA USING SELECTED SURVEY CONTROL MONUMENTS. CONTACT WITH TVA SURVEYING DEPARTMENT (423)751-8416 OR (423)751-2571 SHALL BE MADE BEFORE ANY SURVEY OR CONSTRUCTION WORK IS COMMENCED. BASE STATION FREQUENCIES AND TRANSFORMATION PARAMETERS WILL BE PROVIDED TO THE CONTRACTOR FOR USE IN CONSTRUCTION ACTIVITIES AT THE SITE. PREVIOUSLY USED OR ESTABLISHED CONTROL POINTS AND MONUMENTS SHALL NOT BE USED BY THE CONTRACTOR WITHOUT PRIOR APPROVAL BY TVA SURVEYING DEPARTMENT.

- TOPOGRAPHIC MAPPING SOURCE NOTES:**
- THESE DRAWINGS WERE PREPARED BY STANTEC CONSULTING, INC. USING TOPOGRAPHIC INFORMATION PROVIDED BY TVA DATED APRIL 2012 AND DECEMBER 2013.
 - SURVEY COORDINATES ARE REFERENCED TO TENNESSEE STATE PLANE COORDINATE SYSTEM (LAMBERT), NAD27, ELEVATIONS ARE BASE ON NGVD 29.

LEGEND

- BASELINE
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- CHANNEL LINING
- LIMITS OF CONSTRUCTION
- LIMITS OF GRADING
- BUILDING
- LIGHT POLE
- POWER POLE
- BOLLARD
- TREE LINE
- EDGE OF WATER
- PROPERTY LINE
- CENTERLINE OF SWALE
- CULVERT
- FENCE LINE
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- UNPAVED ROAD
- PAVED ROAD
- RIPRAP

SECTION OR DETAIL NO.

SHEET WHERE SHOWN

REFERENCE KEY

GRAPHIC SCALE: 1" = 50'

CONTOUR INTERVAL = 2 FEET

10% CONCEPTUAL DESIGN
ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

PLAN -- GRADING AND DRAINAGE
SCALE: 1"=50'

Stantec

16509 Timberwood Circle, Suite 100
Louisville, Kentucky 40223-5301
www.stantec.com

SEE XXXXXX-XXX FOR LIST OF DESIGN, COMPANION, REFERENCE DRAWINGS AND SUPPORTING DESIGN CALCULATIONS NUMBER.

R - - - - -												DISCIPLINE INTERFACE
RA	03/05/14	JES	RRP	MCV	ALV	SHB	MST	JCK	-	-	-	
ISSUED FOR REVIEW												
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SCALE: 1" = 50'												EXCEPT AS NOTED
YARD ASH AREA NO. 1												
ASH AREA NO. 1 NORTH DRAINAGE CULVERT GRADING AND DRAINAGE												
DESIGNED BY: J.E. SPALDING	DRAWN BY: R.R. PETTY	CHECKED BY: M.C. VAUGHAN	SUPERVISED BY: A.L. VANCE	REVIEWED BY: S.H. BICKEL	APPROVED BY: M.S. TURNBOW	ISSUED BY: J.C. KAMMEYER						
JOHNSONVILLE FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING												
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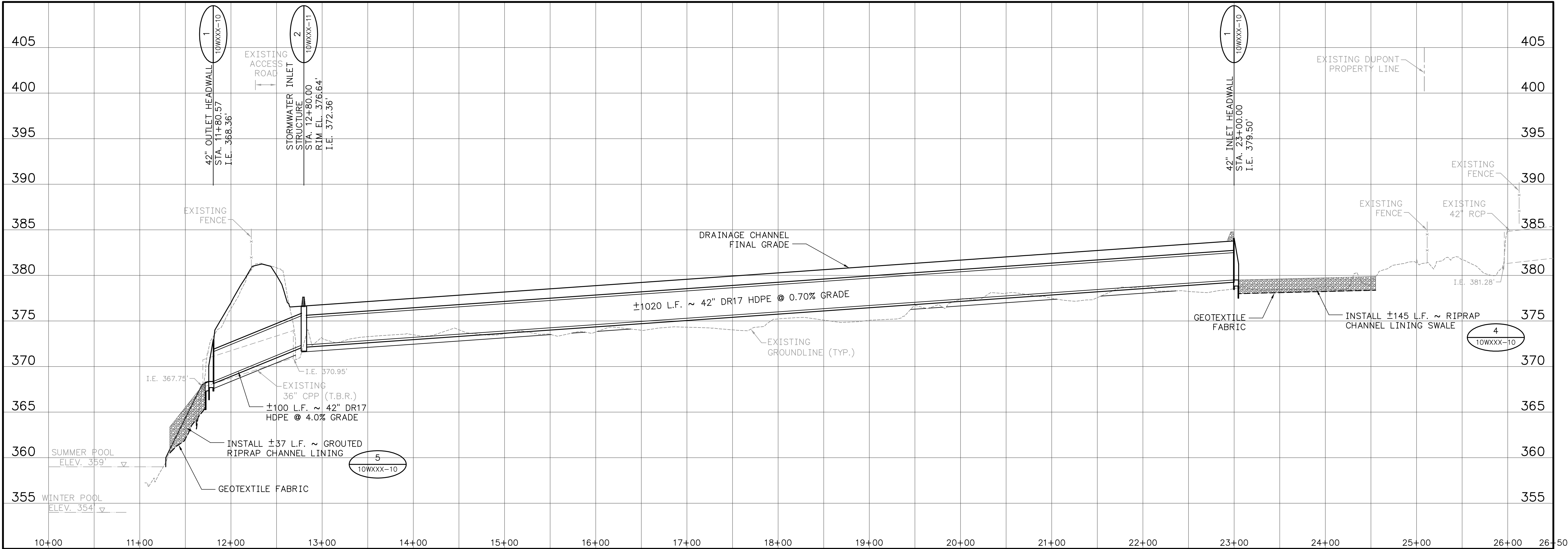
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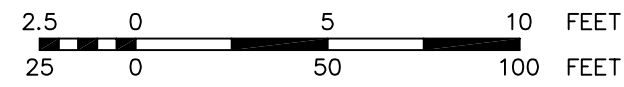
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10WXXX-05

PROFILE — NORTH DRAINAGE CULVERT

SCALE: 1"=50' (HORIZONTAL)
1"=5' (VERTICAL)



SECTION OR DETAIL NO.

SHEET WHERE SHOWN

REFERENCE KEY

10% CONCEPTUAL DESIGN

ISSUED FOR REVIEW

NOT FOR CONSTRUCTION



SEE XXWXXX-XXX FOR LIST OF
DESIGN, COMPANION, REFERENCE
DRAWINGS AND SUPPORTING
DESIGN CALCULATIONS NUMBER.

R - - - - -												DISCIPLINE INTERFACE
RA	03/05/14	JES	RRP	MCV	ALV	SHB	MST	JCK	-	-	-	
ISSUED FOR REVIEW												
REV. NO.	DATE	DSGN	DRAWN	CHKD	SUPV	RVMD	APPD	ISSD	PROJECT ID	AS CONST	REV CY	
SCALE: AS SHOWN												
EXCEPT AS NOTED												
YARD												
ASH AREA NO. 1												
ASH AREA NO. 1												
NORTH DRAINAGE CULVERT												
CHANNEL PROFILES												
DESIGNED BY: J.E. SPALDING	DRAWN BY: R.R. PETTY	CHECKED BY: M.C. VAUGHAN	SUPERVISED BY: A.L. VANCE	REVIEWED BY: S.H. BICKEL	APPROVED BY: M.S. TURNBOW	ISSUED BY: J.C. KAMMEYER						
JOHNSONVILLE FOSSIL PLANT												
TENNESSEE VALLEY AUTHORITY												
FOSSIL AND HYDRO ENGINEERING												
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STANTEC

TASK COMPLETED BY:

A

REV NO.

PLOT FACTOR:1

W_TVA

C.A.D. DRAWING

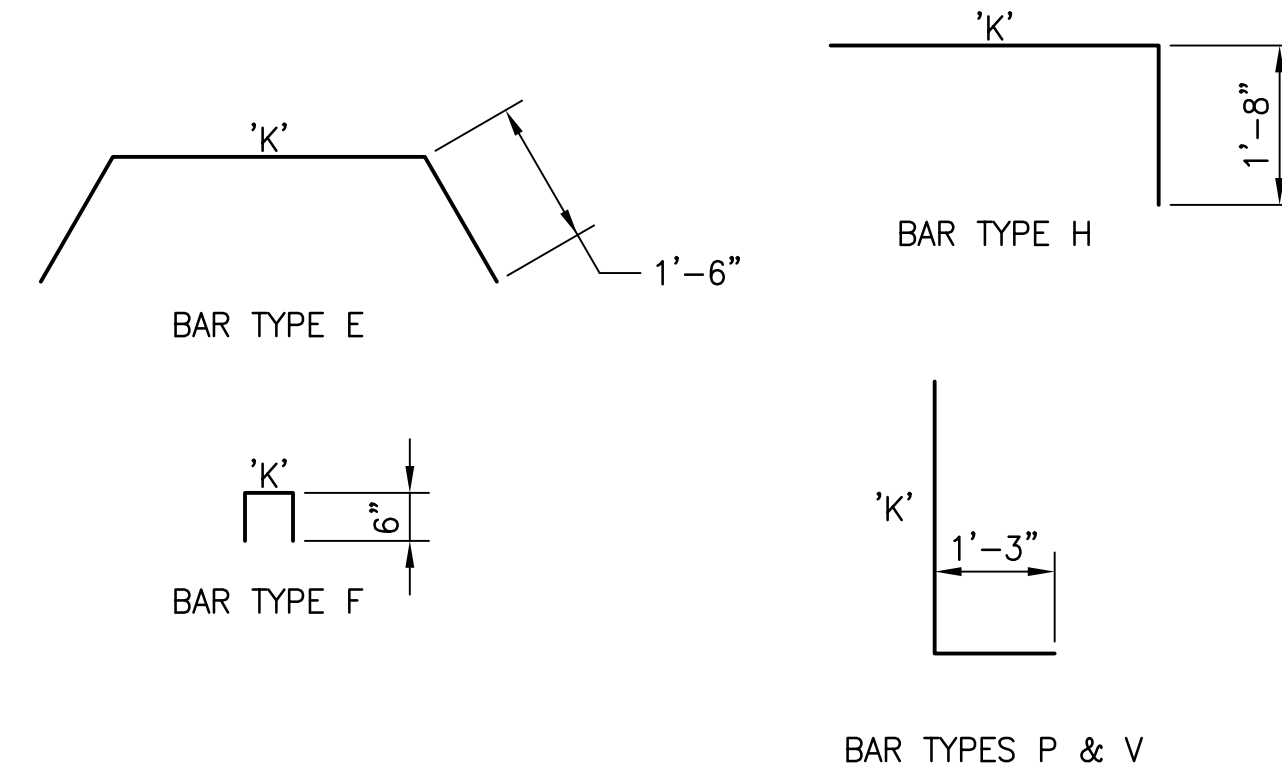
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PLOT DATE: 03/05/2014 USER: PETTY, RICHARD
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NOTES:

1. DIMENSIONS FROM FACE OF CONCRETE TO STEEL SHALL BE 2" CLEAR DISTANCE.
2. ENCIRCLED LETTERS, ○, INDICATE STEEL BAR LOCATIONS
3. BARS ⑥, ④, ③, ②, ①, ⑤ ARE SPACED 1'-0" O.C. ALL OTHERS BARS SHALL BE EVENLY SPACED.
4. BARS ⑥ AND ⑤ ARE PLACED IN ORDER OF INCREASING LENGTHS, BEGINNING AT THE END OF EACH WING.
5. BARS ③ ARE PLACED IN ORDER OF INCREASING LENGTHS, BEGINNING AT THE TOP OF EACH WING.
6. APRON BETWEEN WINGS SHALL BE SLOPED IN DIRECTION OF FLOW EQUAL TO SLOPE OF PIPE. FRONT FACE OF HEADWALL AND ENDS OF WINGS SHALL REMAIN VERTICAL.
7. CONTRACTOR MAY USE PRECAST IN-LIEU OF CAST IN PLACE.
8. ALL EXPOSED CONCRETE EDGES TO BE CHAMFERED 3/4".

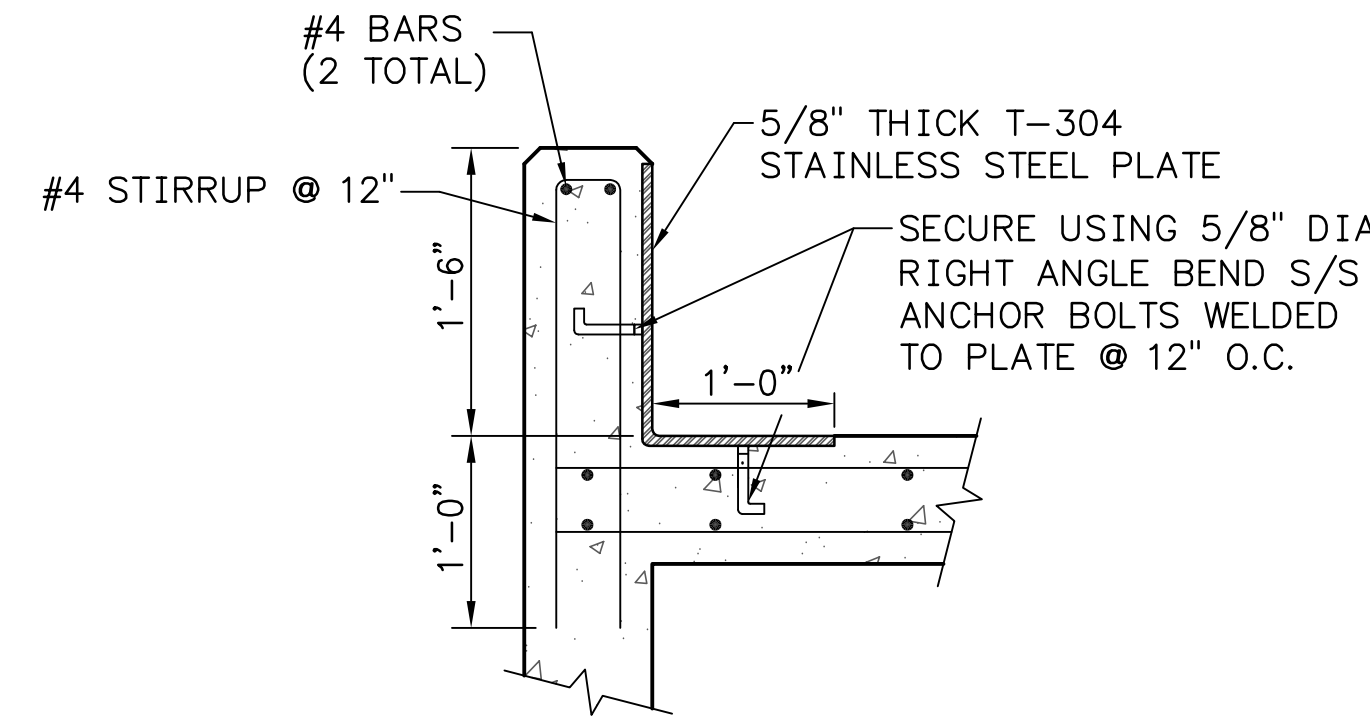
BENT BAR SHAPES



2
10WXXX-10

DETAIL - ENERGY DISSIPATER AND
STAINLESS STEEL SILL GUARD

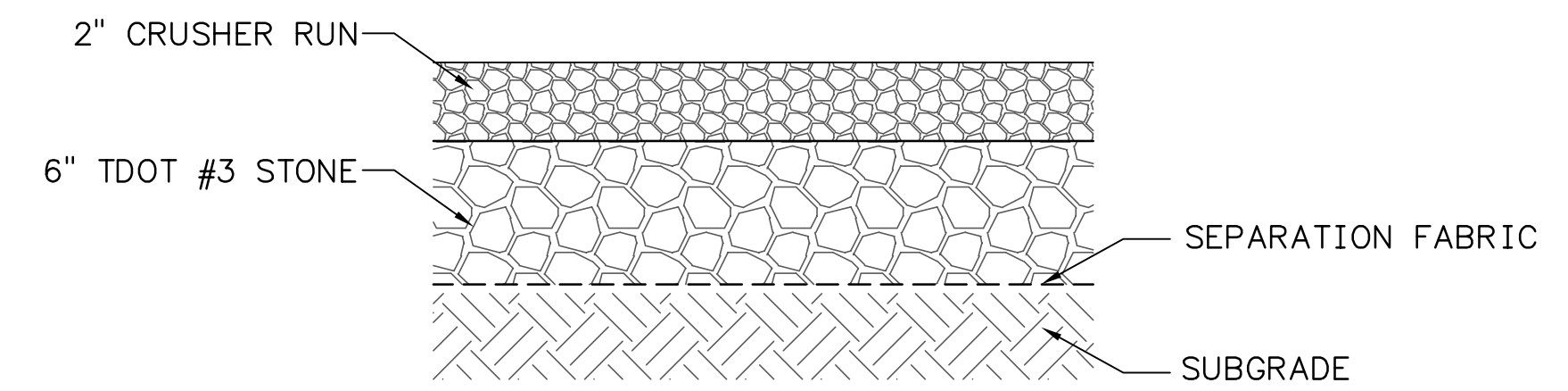
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3
10WXXX-10

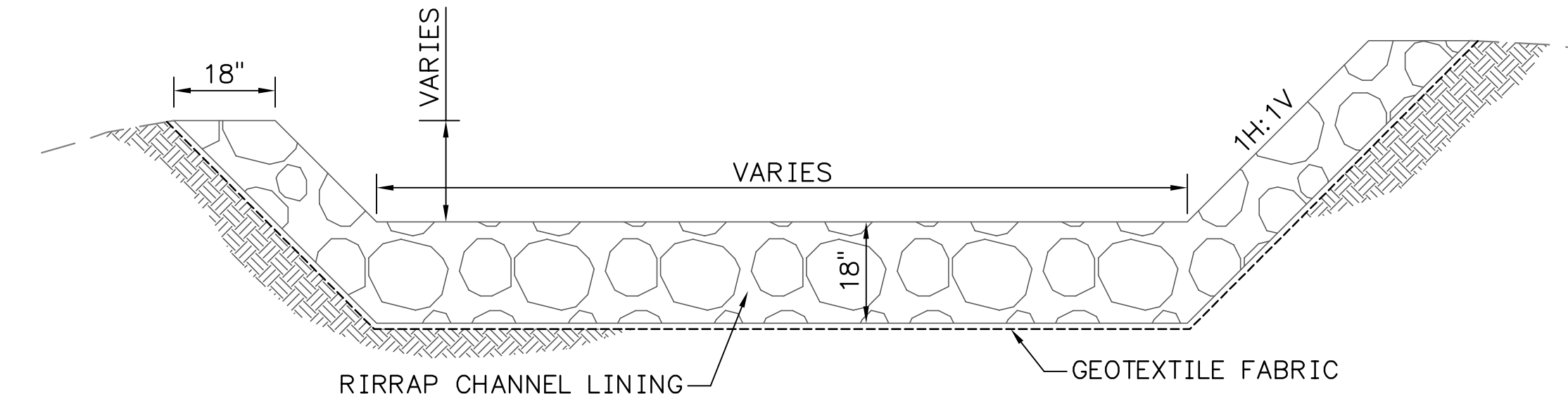
DETAIL - ACCESS ROAD

SCALE: 1/2"=1'-0"

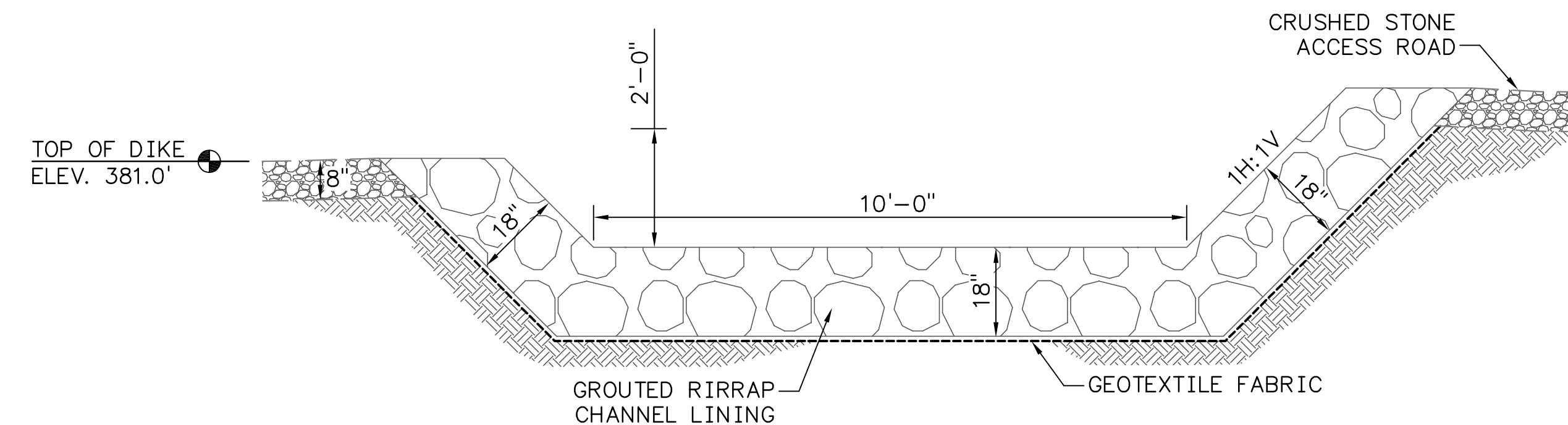


BAR SCHEDULE				
MARK	SIZE	QTY.	LENGTH	'K' LENGTH
A	5	4	6'-2"	
C1	4	2	2'-9"	
C2	4	2	4'-9"	
C3	4	2	5'-6"	
E1	5	2	7'-6"	4'-6"
E2	5	2	7'-10"	4'-10"
F	4	4	1'-3"	0'-4"
G1	4	3	6'-4"	
G2	4	3	8'-7"	
H	4	5	6'-3"	4'-7"
N	4	6	5'-6"	
Q	4	2	3'-11"	
R	4	4	0'-9"	
V1	5	4	3'-6"	2'-3"
V2	5	4	4'-6"	3'-3"
V3	5	4	5'-6"	4'-3"

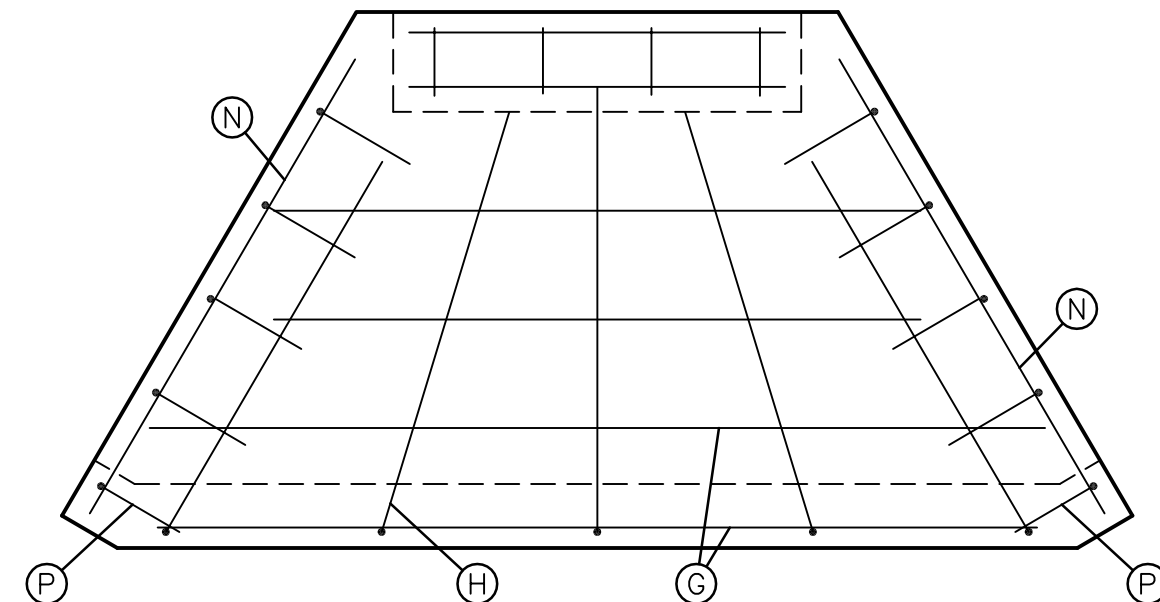
4 SECTION - RIPRAP CHANNEL LINING



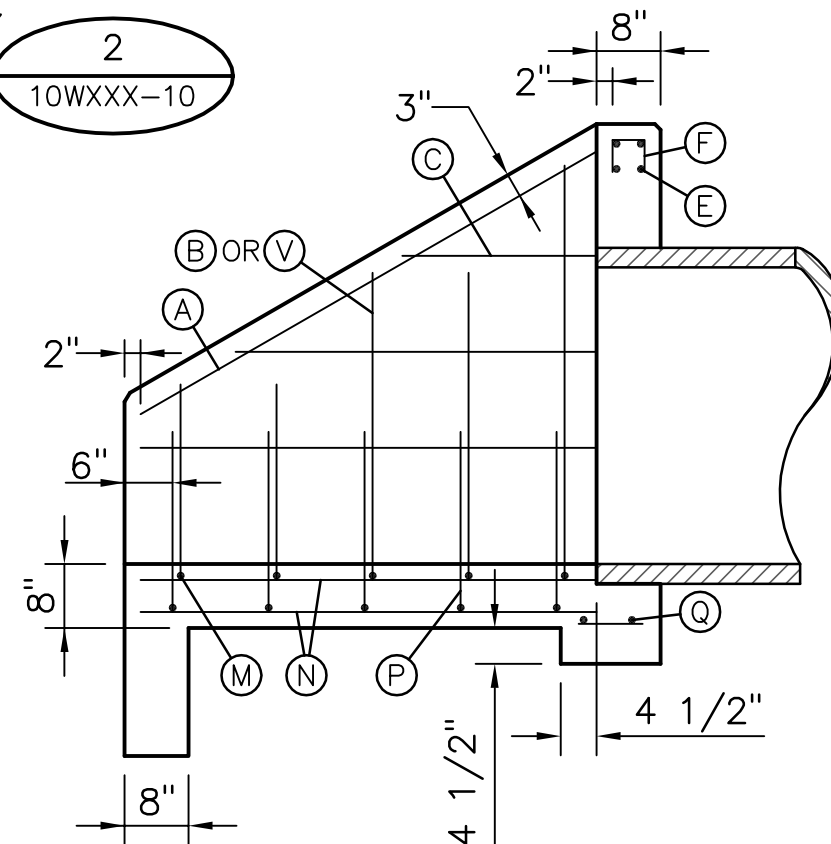
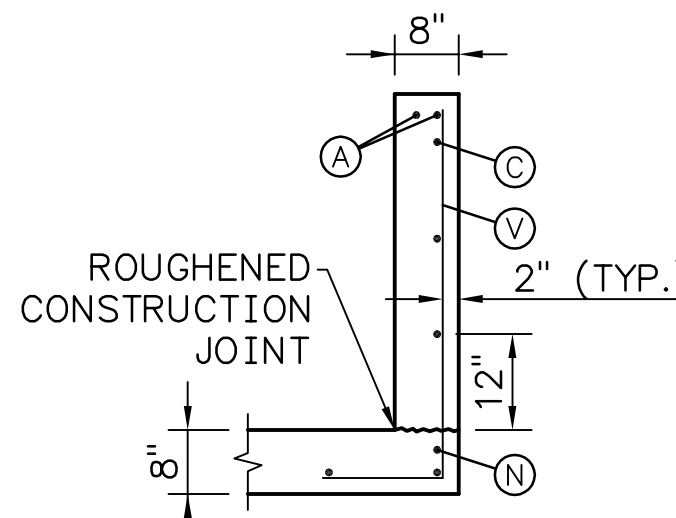
5 SECTION - GROUTED RIPRAP CHANNEL LINING SPILLWAY
10WXXX 10 SCALE: 1/2"=1'-0"



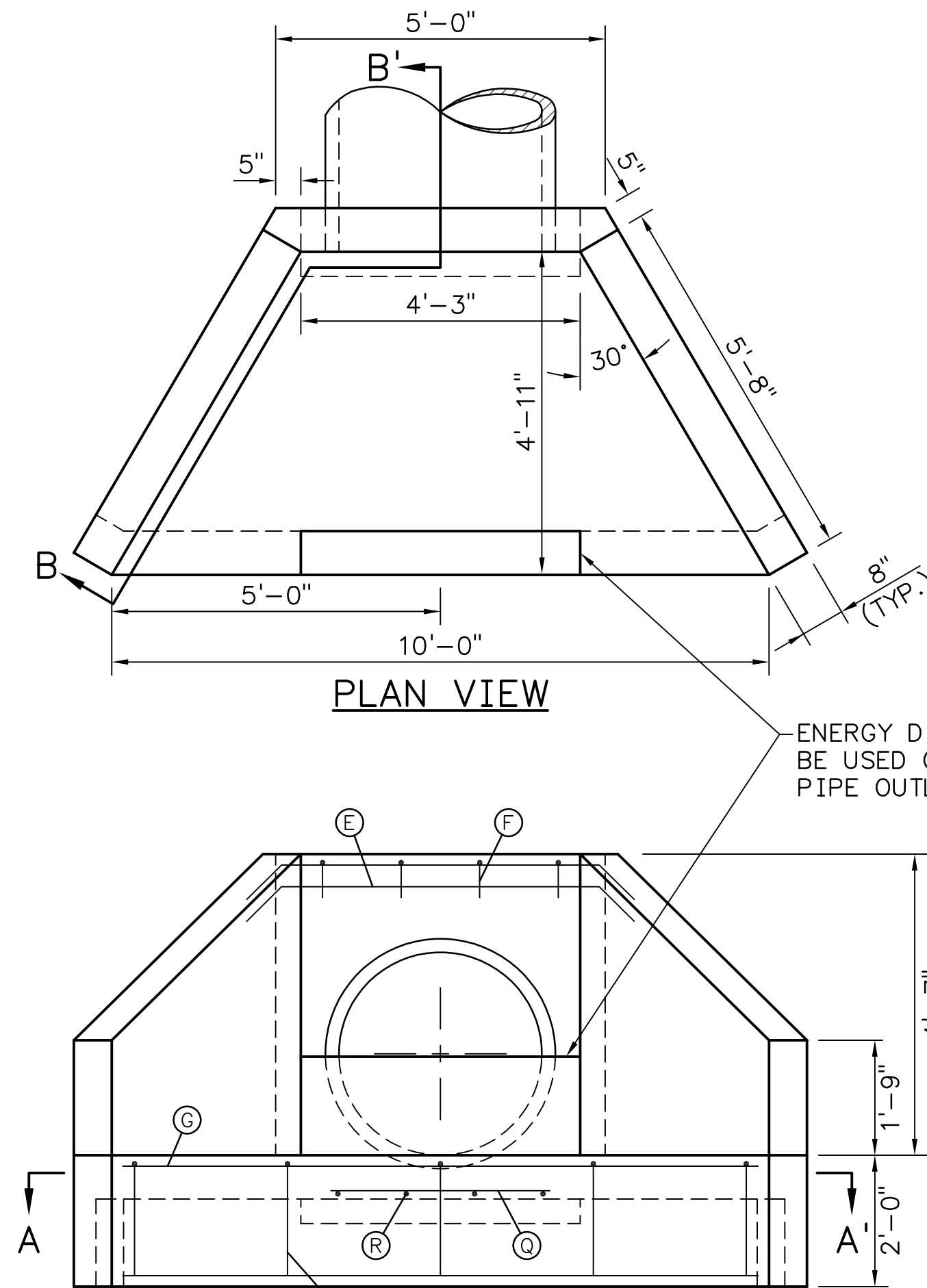
SECTION A-A'



SECTION B-B'

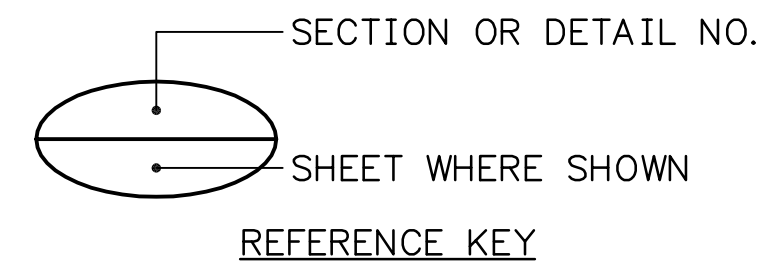
WING SECTION

FRONT ELEVATION



DETAIL - CONCRETE HEADWALL - 42" PIPE
SCALE: 1/2" = 1'-0"

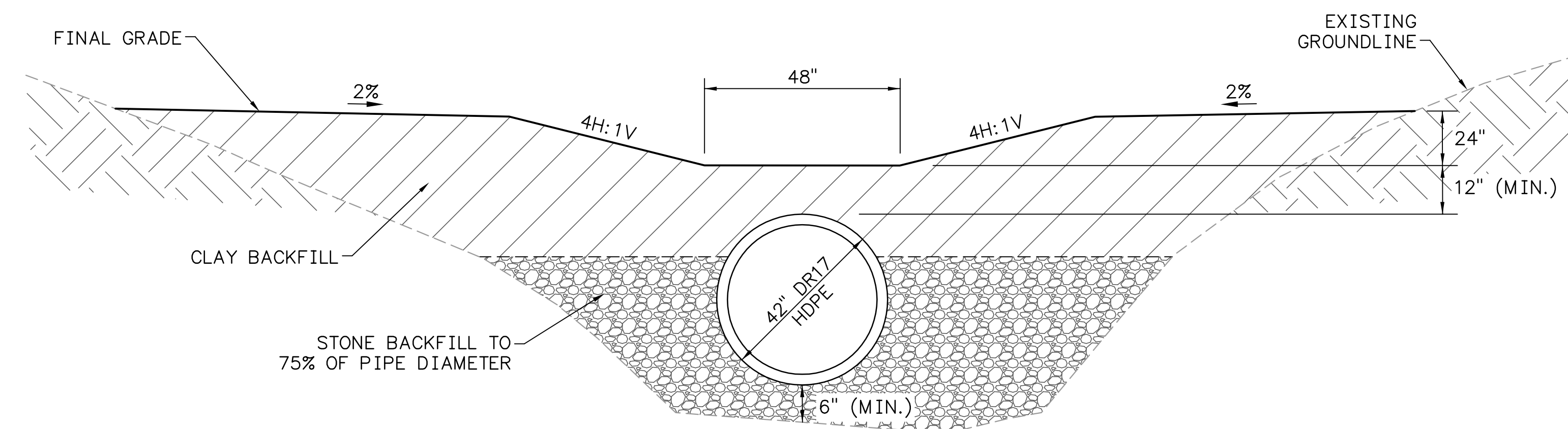
**ISSUED FOR REVIEW
NOT FOR CONSTRUCTION**



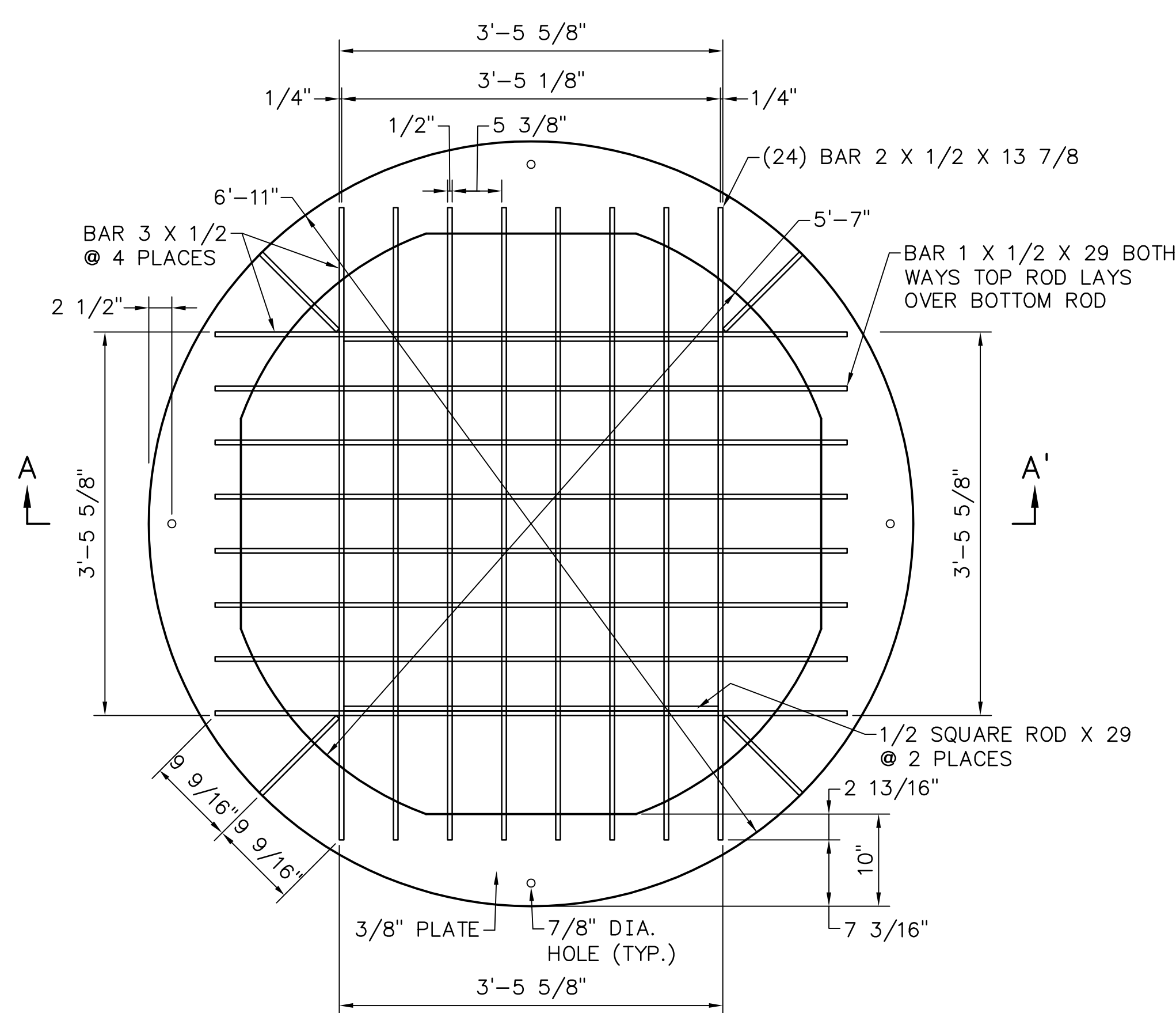
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SEE XXWXXX-XXX FOR LIST OF
DESIGN, COMPANION, REFERENCE
DRAWINGS AND SUPPORTING
DESIGN CALCULATIONS NUMBER.

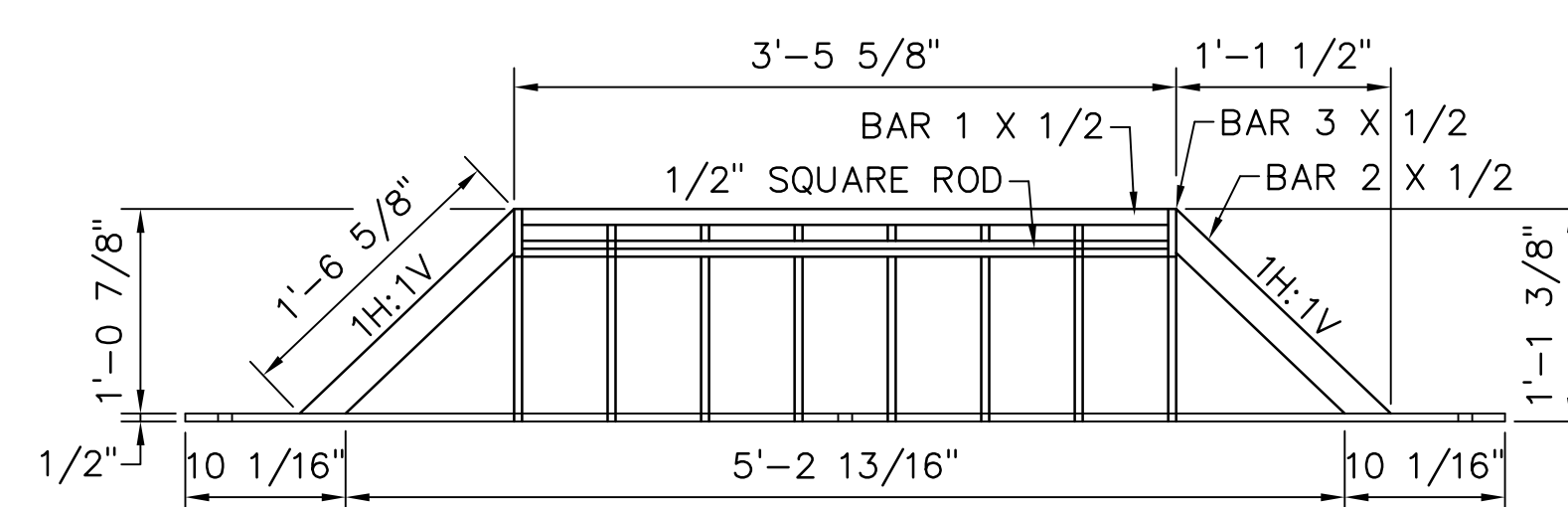
[illegible]



1 INTERIM SWALE AND COVER
10WXXX-11 SCALE: 1"=2'



PLAN



SECTION A-A'

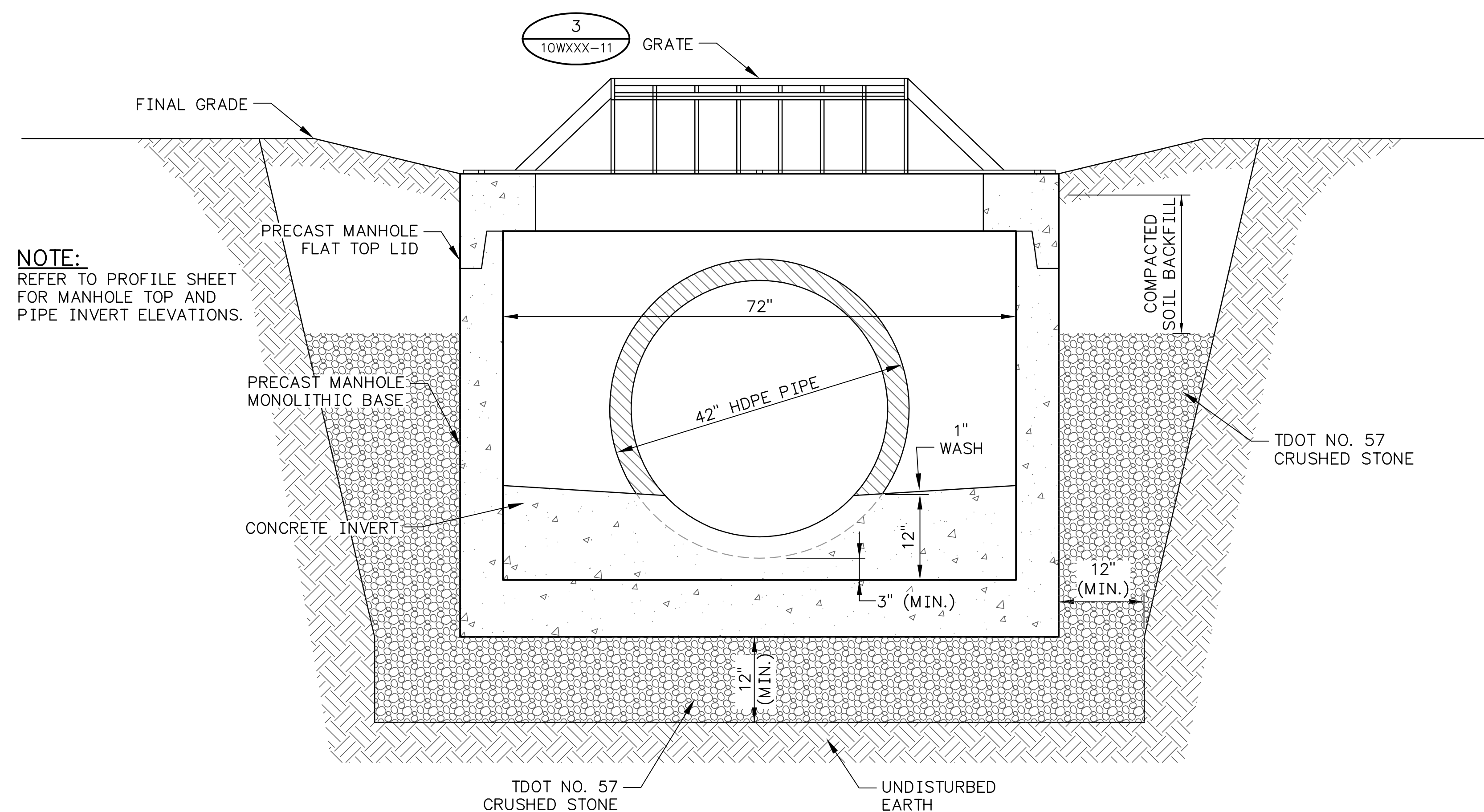
NOTE:
J.R. HOE AND SONS OR APPROVED EQUAL.

3
10WXXX-11

DETAIL - GRATE

SCALE: 1"=1'-0"

DIL GRATE



2
10WXXX-11

DETAIL - STORMWATER INLET STRUCTURE INSTALLATION

SCALE: 1"=1'-0"

NOTE:
REFER TO PROFILE SHEET
FOR MANHOLE TOP AND
PIPE INVERT ELEVATIONS.

**ISSUED FOR REVIEW
NOT FOR CONSTRUCTION**

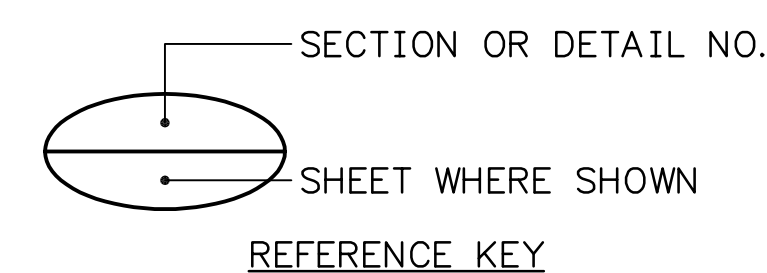
R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R A	03/05/14	JES	RRP	MCV	ALV	S HB	MST	JCK									
<u>ISSUED FOR REVIEW</u>																	
REV. NO.	DATE	DGN	DRWN	CHKD	SUPV	RVND	APPD	ISSD		PROJECT ID	AS CONST	REV CD					
SCALE: AS SHOWN												EXCEPT AS NOTED					

SCALE: AS SHOWN										EXCEPT AS NOTED									
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YARD ASH AREA NO. 1
ASH AREA NO. 1 NORTH DRAINAGE CULVERT DETAILS

DESIGNED BY: J.E. SPALDING	DRAWN BY: R.R. PETTY	CHECKED BY: M.C. VAUGHAN	SUPERVISED BY: A.L. VANCE	REVIEWED BY: S.H. BICKEL	APPROVED BY: M.S. TURNBOW	ISSUED BY: J.C. KAMMEYER
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JOHNSONVILLE FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING					
AUTOCAD R 2000	DATE 03/05/14	30	C	10WXXX-11	R A



SEE XXWXXX-XXX FOR LIST OF
DESIGN, COMPANION, REFERENCE
DRAWINGS AND SUPPORTING
DESIGN CALCULATIONS NUMBER.

STANTEC	A
TASK COMPLETED BY:	REV NO.

PLOT FACTOR:XX
W TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

GENERAL NOTES

1. THESE DRAWINGS WERE PREPARED BY STANTEC CONSULTING SERVICES INC. (STANTEC) USING TOPOGRAPHIC INFORMATION PROVIDED BY TVA DATED APRIL 2012 AND DECEMBER 2013. ACTUAL CONDITIONS MAY VARY FROM THOSE SHOWN ON THESE DRAWINGS AND SHOULD BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. DEFINITIONS: WHENEVER THE FOLLOWING TERMS ARE USED IN THESE PLANS FOR CONSTRUCTION, IT IS UNDERSTOOD THAT THEY REPRESENT THE FOLLOWING:

CONTRACTOR: ENTITY RESPONSIBLE FOR CONSTRUCTION.

ENGINEER: STANTEC CONSULTING SERVICES INC. (STANTEC)

OWNER: TENNESSEE VALLEY AUTHORITY (TVA) – JOHNSONVILLE FOSSIL PLANT (JOF)

TDOT: TENNESSEE DEPARTMENT OF TRANSPORTATION AND SPECIFICALLY REFERENCES THE "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", CURRENT EDITION. ANY MATERIAL DESIGNATED AS "TDOT" IS TO CONFORM TO THE MATERIAL STANDARDS NOTED AND PLACEMENT/INSTALLATION METHODOLOGY SPECIFIED IN THE CURRENT EDITION OF THE "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN: REFERS TO A DOCUMENT THAT ESTABLISHES MINIMUM QUALITY ASSURANCE REQUIREMENTS, TESTING FREQUENCY AND QUALITY OVERSIGHT RESPONSIBILITY.

QUALITY ASSURANCE (QA) MANAGER: A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF TENNESSEE THAT IS RESPONSIBLE FOR THE QUALITY OF THE CONSTRUCTED PROJECT AS DEFINED IN THE CQA PLAN. THE QA TEAM CONSISTS OF QUALIFIED PERSONNEL THAT WORK UNDER THE DIRECT SUPERVISION OF THE QA MANAGER. QA TEAM PERSONNEL ARE INDIVIDUALS THAT ARE FAMILIAR WITH THE MATERIALS UTILIZED AND THE CONSTRUCTION COMPONENTS.
3. WHENEVER REFERENCE IS MADE TO TENNESSEE DEPARTMENT OF TRANSPORTATION (TDOT) STANDARD SPECIFICATIONS, THE AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM), AMERICAN CONCRETE INSTITUTE (ACI), OR OTHER PUBLISHED STANDARDS OR SPECIFICATIONS, IT SHALL MEAN THE LATEST VERSION IN ITS ENTIRETY.
4. THESE PLANS FOR CONSTRUCTION, ALONG WITH THE TECHNICAL SPECIFICATIONS, CQA PLAN, AND OTHER REFERENCED DOCUMENTS OR STANDARDS, SHALL CONSTITUTE THE COMPLETE CONSTRUCTION DOCUMENTS FOR THIS PROJECT.
5. THE CONTRACTOR SHALL COMMUNICATE CONSTRUCTABILITY ISSUES, DISCREPANCIES IN THE PLANS FOR CONSTRUCTION OR SPECIFICATIONS, ETC., TO THE QA MANAGER AND OWNER IMMEDIATELY UPON BECOMING AWARE. THE CONTRACTOR SHALL USE THE OWNER'S REQUEST FOR INFORMATION (RFI) FORM THAT IS CONTAINED IN THE CQA PLAN TO COMMUNICATE AND ESTABLISH WRITTEN DOCUMENTATION OF THE ISSUE AND ITS RESOLUTION.
6. THE CONTRACTOR SHALL KEEP A RECORD OF ALL DEVIATIONS IN LOCATION, ELEVATION, METHOD, OR MATERIAL USED FROM THAT SHOWN ON THESE PLANS. AT COMPLETION OF THE PROJECT A PLAN SET OF FINAL RECORD DRAWINGS SHALL BE PREPARED BY THE ENGINEER TO ENSURE THAT TVA HAS A PERMANENT RECORD OF THE PROJECT AS IT WAS CONSTRUCTED. THE CONTRACTOR SHALL COOPERATE FULLY BY PROVIDING HIS RECORD OF DEVIATIONS, AND SHALL ASSIST WITH PREPARATION OF THE FINAL RECORD DRAWINGS.
7. CONSTRUCTION ACTIVITIES SHALL BE OBSERVED BY THE QA MANAGER OR THE DESIGNATED REPRESENTATIVE ON THE QA TEAM. THE CONTRACTOR SHALL COORDINATE WITH THE ONSITE QA REPRESENTATIVE AND INFORM THE REPRESENTATIVE OF THE CONTRACTOR'S SCHEDULED WORK SHIFTS TO INSURE THAT QC REPRESENTATION OCCURS AS REQUIRED.
8. MATERIAL DELIVERIES AND HAULING FOR THIS PROJECT SHALL NOT BE PERMITTED DURING THE HOURS OF NORMAL PLANT SHIFT CHANGE (6:30 TO 7:00 A.M. AND 3:30 TO 3:45 P.M.)
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR HEALTH AND SAFETY OF ITS PERSONNEL AND SHALL MEET INDUSTRY STANDARD REQUIREMENTS. THE CONTRACTOR SHALL ADHERE TO THE OWNER'S REQUIREMENTS FOR SAFETY DURING CONSTRUCTION.
10. THE CONTRACTOR SHALL COORDINATE WITH TVA TO LOCATE AND VERIFY ALL UTILITIES PRIOR TO COMMENCING WORK TO ENSURE THERE SHALL BE NO CONFLICT WITH THE IMPROVEMENTS PRESENTED HEREIN. ONSITE UTILITIES AND UNDERGROUND FACILITIES, WHETHER SHOWN ON THE PLANS OR NOT, SHALL BE PROTECTED BY THE CONTRACTOR FROM DAMAGE BY THE CONTRACTOR'S OPERATIONS. IF DAMAGE OCCURS THE CONTRACTOR SHALL COORDINATE REPAIRS WITH THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE THAT OCCURS.
11. EXISTING GEOTECHNICAL INSTRUMENTATION (PIEZOMETERS AND SLOPE INCLINOMETERS) IS SHOWN ON THE PLANS FOR CONSTRUCTION. THE CONTRACTOR SHALL PROTECT THIS INSTRUMENTATION FROM DAMAGE. THIS INSTRUMENTATION SHALL BE REMOVED AND HANDED OVER TO THE OWNER DURING THE COURSE OF THE WORK IF NEEDED.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF ALL ACCESS ROADS, STAGING AREAS AND STORAGE AREAS USED DURING CONSTRUCTION, AND SHALL RESTORE SAID AREAS TO THEIR ORIGINAL CONDITION, OR BETTER, ONCE CONSTRUCTION IS COMPLETE UNLESS THE OWNER GIVES WRITTEN PERMISSION TO THE CONTRACTOR TO RETAIN THE AREA "AS IS."
13. VEGETATIVE AND ORGANIC MATERIALS SHALL BE REMOVED AS DESCRIBED IN THE SPECIFICATIONS.
14. ALL PIPE REMOVAL AND TRENCHING SHALL BE CONDUCTED IN STRICT ACCORDANCE WITH APPLICABLE TVA PROCESS AND PROCEDURE REQUIREMENTS.
15. PROPOSED STAGING AND STOCKPILE STORAGE AREAS ARE SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER (TVA) REGARDING USE OF THESE AREAS, AND OF ANY OTHER LOCATIONS PROPOSED BY THE CONTRACTOR. STAGING AND STOCKPILE STORAGE AREAS SHALL BE APPROVED BY THE OWNER.

16. STOCKPILES SHALL BE GRADED TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES. THE SIDE SLOPES SHALL HAVE MAXIMUM 3H:1V SLOPE. THE TOP OF THE STOCKPILE SHALL HAVE A MINIMUM TWO PERCENT SLOPE. MATERIALS SHALL BE SEGREGATED AS DIRECTED BY THE QC MANAGER.
17. FINAL EMBANKMENT SURFACES SHALL BE FINISHED TO A RELATIVELY SMOOTH AND COMPACT SURFACE. CONTRACTOR SHALL REVEGETATE SLOPE WITH SOD. SOD SHALL BE PLACED AS SHOWN ON THESE PLANS FOR CONSTRUCTION AND SHALL BE IN ACCORDANCE WITH THE TENNESSEE EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.
18. GEOTEXTILES USED FOR CONSTRUCTION SHALL BE CERTIFIED BY THE MANUFACTURER AS CONFORMING TO THE PROJECT REQUIREMENTS. GEOTEXTILES SHALL NOT BE UTILIZED AS A FILTER UNLESS APPROVED BY TVA. IT MAY BE USED AS A TEMPORARY MEASURE AND REMOVED.
19. ALL SURFACES SHALL BE APPROVED BY THE QA MANAGER OR THE DESIGNATED REPRESENTATIVE ON THE QA TEAM PRIOR TO EMBANKMENT OR LINEAR CONSTRUCTION.
20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION SURVEYOR SELECTION AND COORDINATION OF ALL CONSTRUCTION RELATED SURVEYING. ALL ESTABLISHED TVA BENCH MARKS OR OTHER MONUMENTS SHALL BE PRESERVED AND PROTECTED. ANY ESTABLISHED MARKER OR BENCHMARK THAT IS DAMAGED BY CONSTRUCTION ACTIVITIES SHALL BE REPLACED BY TVA SURVEYING SERVICES AT THE CONTRACTOR'S EXPENSE.

EROSION PREVENTION AND SEDIMENT CONTROL (FPSC)

1. THE CONTRACTOR SHALL EXERCISE EVERY REASONABLE PRECAUTION AT ALL TIMES TO MINIMIZE SOIL EROSION AND PREVENT WATER POLLUTION BY DEPOSITION OF SEDIMENT INTO THE ADJACENT WATERWAYS. SOIL EROSION AND SEDIMENT CONTROLS MUST BE USED AND MAINTAINED IN EFFECTIVE OPERATING CONDITION DURING CONSTRUCTION, AND EXPOSED SOIL AND OTHER FILL MUST BE PERMANENTLY STABILIZED AT THE EARLIEST PRACTICABLE DATE.
2. SILT FENCES SHALL BE INSTALLED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES IN ANY AREA WHERE THEY ARE SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL INSPECT THE SILT FENCE FOR DAMAGE AND SEDIMENT BUILDUP EVERY 7 DAYS AND WITHIN 24 HOURS OF A PRECIPITATION EVENT THAT PRODUCES 1/2-INCH OR MORE OF RAINFALL. IF THE FENCE FABRIC IS UNDERMINED, TORN, OR IN ANY WAY BECOMES INEFFECTIVE, IT SHALL BE IMMEDIATELY REPAIRED OR REPLACED BY THE CONTRACTOR. SILT FENCES REMOVED TO PROVIDE ACCESS FOR EQUIPMENT AND VEHICLES SHALL BE REPLACED AT THE END OF THE WORK DAY.
3. ROCK BERMS SHALL BE CONSTRUCTED OF QUARRIED CRUSHED STONE PRIOR TO PERFORMING ANY EXCAVATION OR PIPE REMOVAL ACTIVITIES BELOW THE WATER LEVEL OF KENTUCKY LAKE. ROCK BERMS ARE CONSIDERED TEMPORARY FILLS AND SHALL BE REMOVED TO THE APPROXIMATE PRE-CONSTRUCTION ELEVATIONS.
4. THE CONTRACTOR SHALL ALSO EXERCISE EVERY PRECAUTION AT ALL TIMES TO PREVENT WATER POLLUTION BY NON-STORMWATER DISCHARGES, INCLUDING SPILLS OR RELEASES OF HAZARDOUS MATERIALS.
5. THE CONTRACTOR IS RESPONSIBLE FOR SITE DRAINAGE THROUGHOUT CONSTRUCTION AND SHALL INSTALL TEMPORARY DRAINAGE STRUCTURES OR PUMP WATER AS NECESSARY TO PREVENT INTERFERENCE WITH THE WORK. SUCH TEMPORARY DRAINAGE FEATURES SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF ENVIRONMENTAL PERMITS AND THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP). THE CONTRACTOR SHALL PREPARE A PLAN AND ISSUE TO THE CQA MANAGER FOR REVIEW AND APPROVAL PRIOR TO IMPLEMENTATION.
6. MATERIALS DELIVERED FOR INCORPORATION INTO THE WORK SHALL BE TEMPORARILY STORED IN AREAS SELECTED BY THE CONTRACTOR AND APPROVED BY THE OWNER. MATERIALS SHALL BE STORED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
7. THE EROSION AND SEDIMENT CONTROL MEASURES SHOWN SHALL BE CONSIDERED THE MINIMUM; SUPPLEMENTAL MEASURES SHALL BE PROVIDED BY THE CONTRACTOR AS FIELD CONDITIONS DICTATE.
8. DURING CONSTRUCTION, THE CONTRACTOR SHALL INSPECT, CLEAN, AND MAINTAIN ALL SEDIMENT CONTROL DEVICES AS SHOWN ON THE PLANS FOR CONSTRUCTION AND PROVIDE REPORTING AS REQUIRED BY THE SPECIFICATIONS AND REGULATIONS ON SAID ITEMS.
9. THE CONTRACTOR SHALL CONTROL FUGITIVE DUST EMISSIONS DURING CONSTRUCTION IN SUCH A MANNER AS TO COMPLY WITH APPLICABLE REGULATIONS. DUST CONTROL MEASURES SHALL BE SUBJECT TO APPROVAL OF THE QA MANAGER AND THE OWNER.
10. SOIL STOCKPILES THAT WILL NOT BE DISTURBED FOR 14 DAYS OR MORE SHALL BE TEMPORARILY SEEDED WITH WHEAT OR RYE AT A RATE OF 60 LBS/ACRE AND SHALL BE COVERED WITH MULCH.

10% CONCEPTUAL DESIGN
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SEE XXWXXX-XXX FOR LIST OF DESIGN, COMPANION, REFERENCE DRAWINGS AND SUPPORTING DESIGN CALCULATIONS NUMBER.

R - - - - - - - - - -											
R A 03/05/14 JES RRP MGV ALV SHB MST JCK - - -											
ISSUED FOR REVIEW											
REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID	AS CONST	REV. NO.
SCALE: NONE EXCEPT AS NOTED											
YARD ASH AREA NO. 1											
ASH AREA NO. 1 CAP INSTALLATION GENERAL NOTES											
DESIGNED BY: J.E. SPALDING		DRAWN BY: R.R. PETTY		CHECKED BY: M.C. VAUGHAN		SUPERVISED BY: A.L. VANCE		REVIEWED BY: S.H. BICKEL		APPROVED BY: M.S. TURNBOW	
ISSUED BY: J.C. KAMMEYER											
JOHNSONVILLE FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING											
AUTOCAD R 2000		DATE 03/05/14		30		C		10WXXX-02		R A	

STANTEC	A
TASK COMPLETED BY:	REV NO.

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C

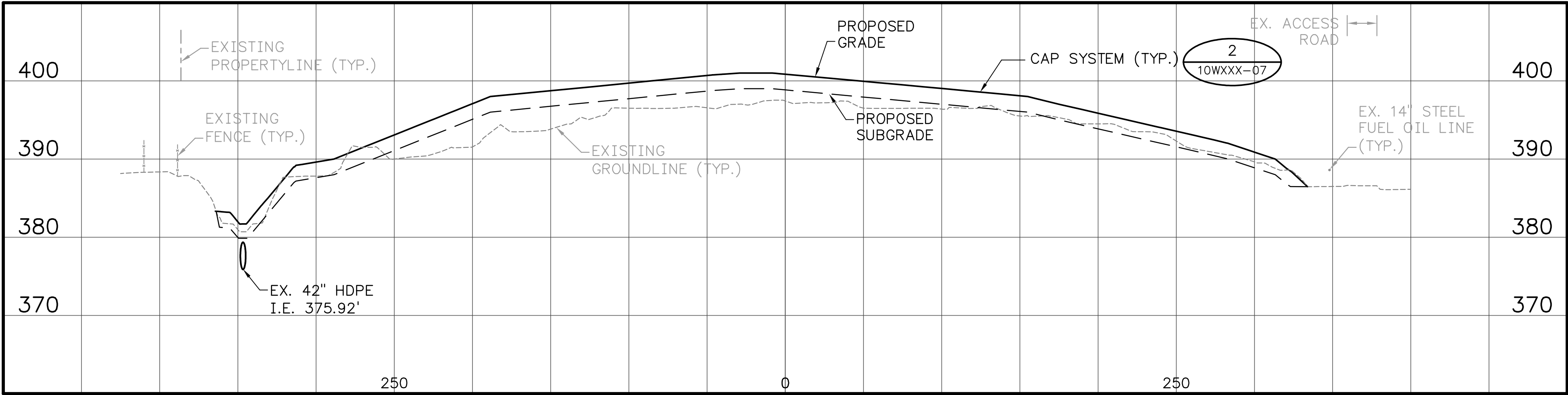
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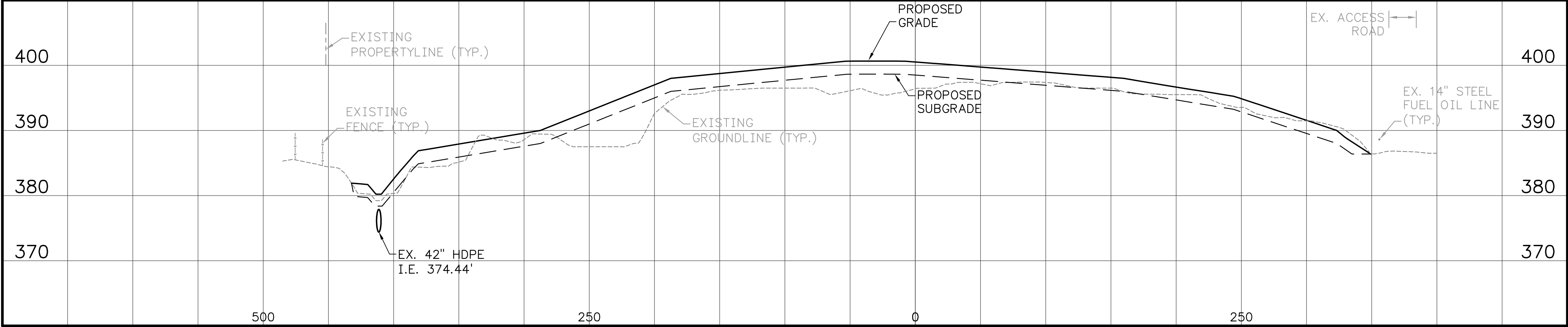
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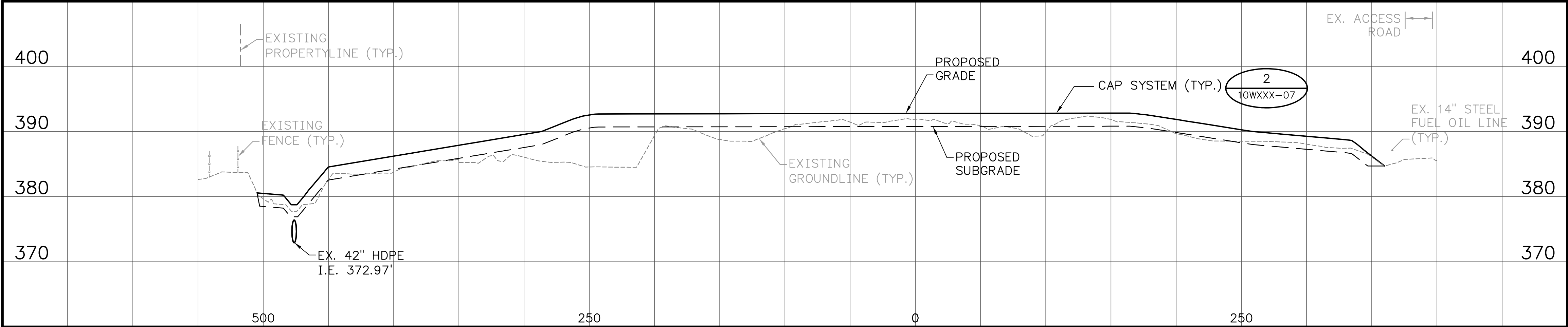
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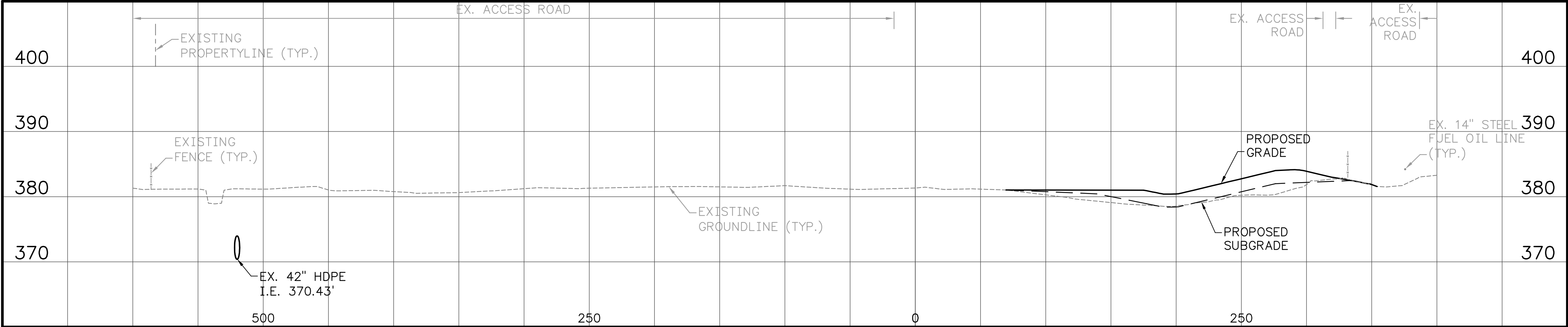
STA. 16+00



STA. 14+00



STA. 12+00



STA. 10+00

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R A															DISCIPLINE INTERFACE	
03/05/14 JES RRP MCV ALV SHB MST JCK															ISSUED FOR REVIEW	
REV. NO.	DATE	DSGN	DRWN	CHGD	SUPV	RVMD	APPD	ISSD	PROJECT ID	AS CONST	REV					
SCALE: 1" = 50' HORZ. 1" = 10' VERT.															EXCEPT AS NOTED	
YARD																
ASH AREA NO. 1																
ASH AREA NO. 1 CAP INSTALLATION																
CROSS SECTIONS																
DESIGNED BY: J.E. SPALDING		DRAWN BY: R.R. PETTY		CHECKED BY: M.C. VAUGHAN		SUPERVISED BY: A.L. VANCE		REVIEWED BY: S.H. BICKEL		APPROVED BY: M.S. TURNBOW		ISSUED BY: J.C. KAMMEYER				
JOHNSONVILLE FOSSIL PLANT																
TENNESSEE VALLEY AUTHORITY																
FOSSIL AND HYDRO ENGINEERING																
AUTOCAD R 2000		DATE 03/05/14		30		C		10WXXX-05					R A			

STANTEC
TASK COMPLETED BY:

A
REV NO.

PLOT FACTOR:1
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

PLOT DATE: 03/05/2014 USER: R.R. PETTY, RICHARD VAUGHAN
X:\VISTA\PROJECTS\20100305\JOHNSONVILLE\DWG\10WXXX-05-100.DWG

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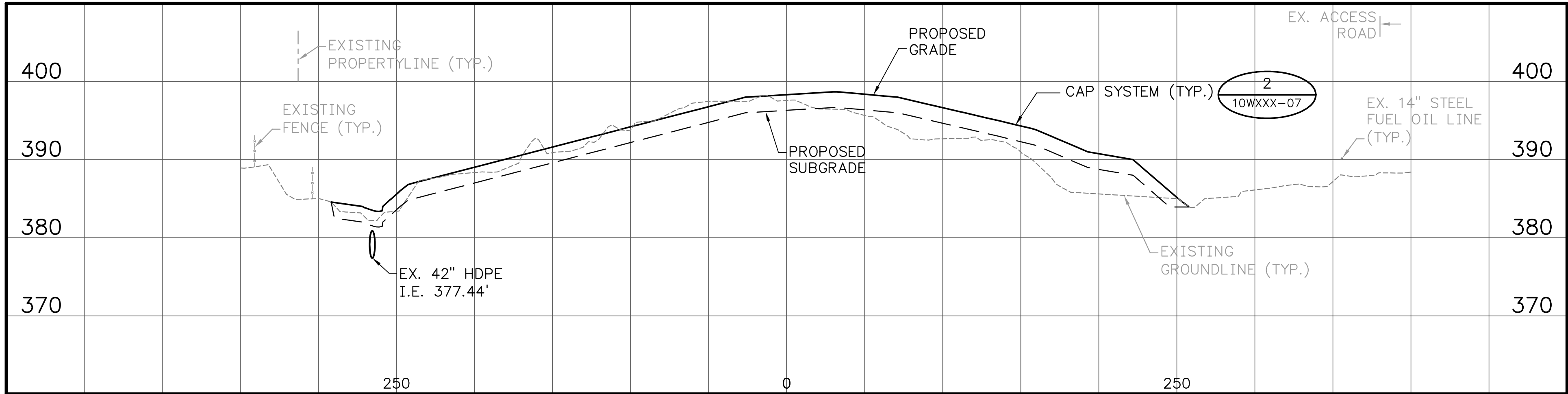
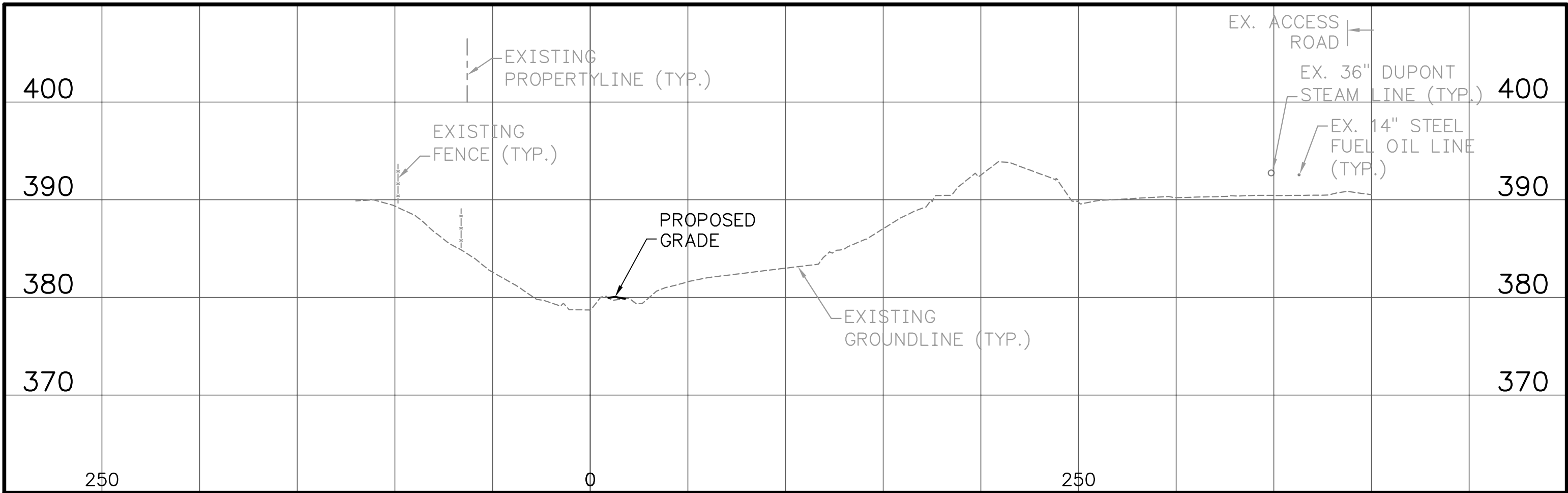
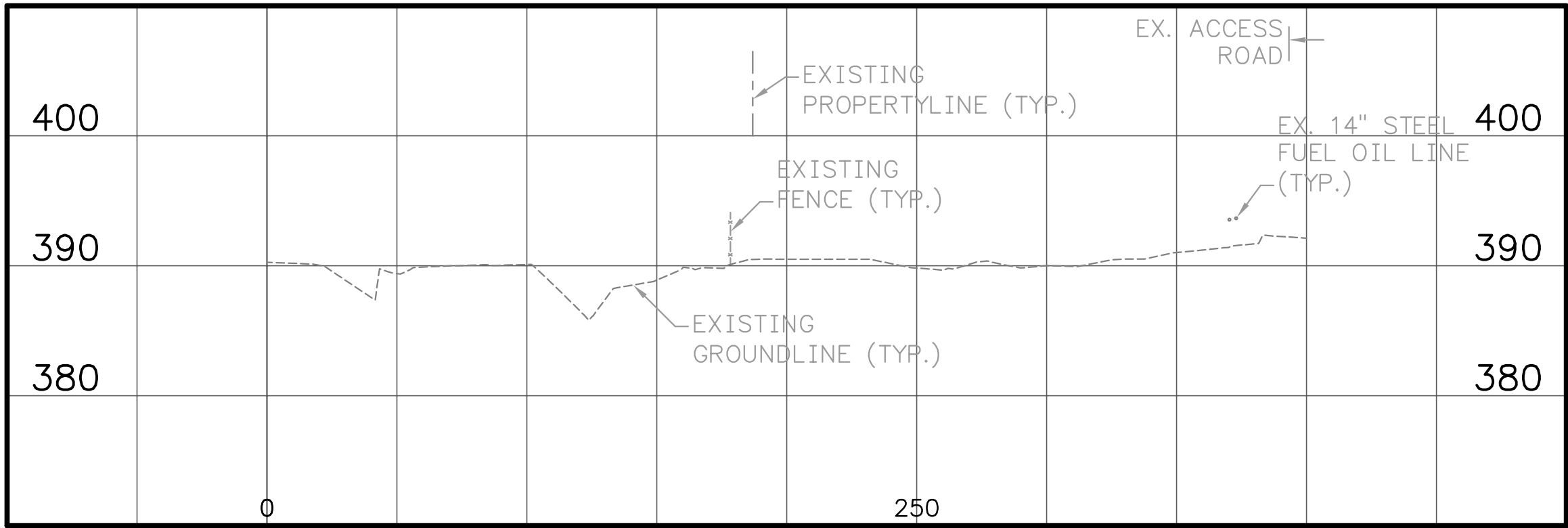
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H



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DRAWINGS AND SUPPORTING
DESIGN CALCULATIONS NUMBER.

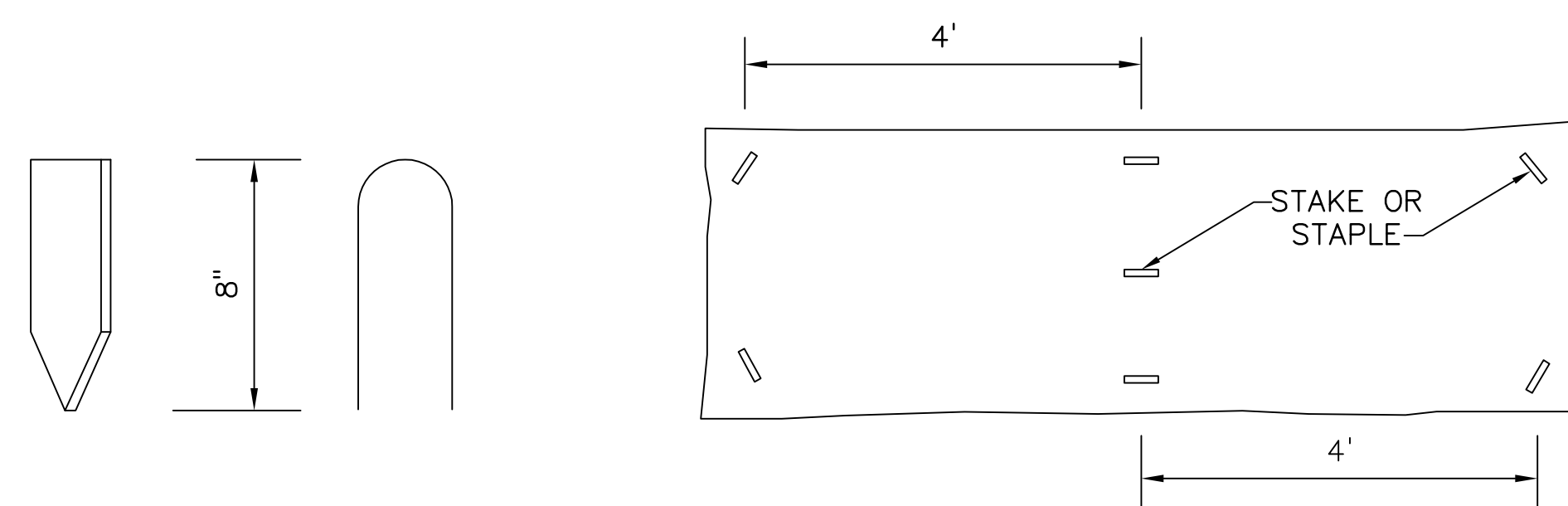
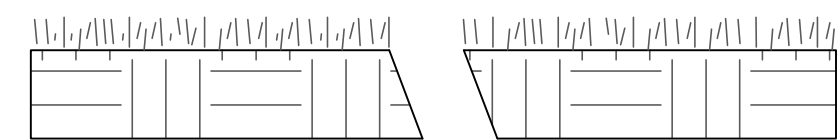
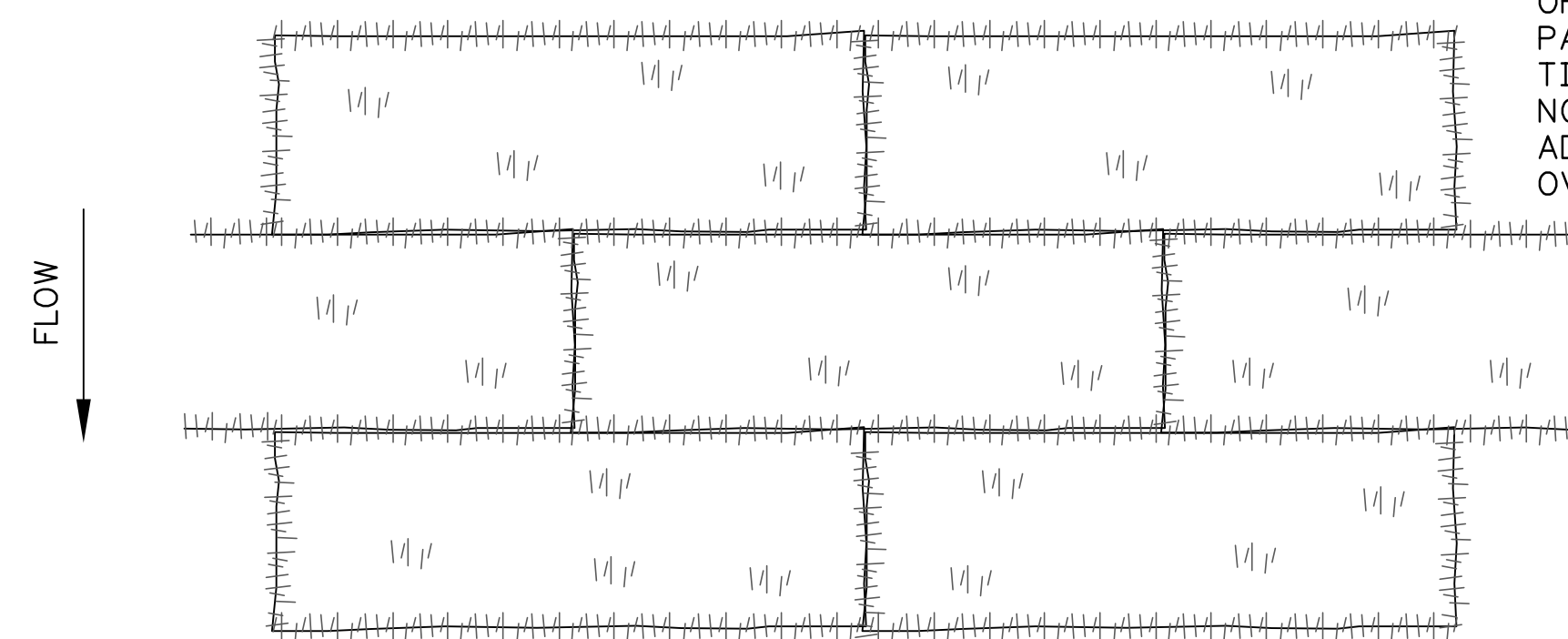
R A 03/05/14 JES RRP MCV ALV SHB MST JCK - - - -												DISCIPLINE INTERFACE
ISSUED FOR REVIEW												
REV NO.	DATE	DSGN	DRAWN	CHKD	SUPV	RVMD	APPD	ISSD	PROJECT ID	AS CONST	REV NO.	
SCALE: 1" = 50' HORZ. 1" = 10' VERT.												EXCEPT AS NOTED
YARD ASH AREA NO. 1												
ASH AREA NO. 1 CAP INSTALLATION CROSS SECTIONS												
DESIGNED BY: J.E. SPALDING		DRAWN BY: R.R. PETTY		CHECKED BY: M.C. VAUGHAN		SUPERVISED BY: A.L. VANCE		REVIEWED BY: S.H. BICKEL		APPROVED BY: M.S. TURNBOW		ISSUED BY: J.C. KAMMEYER
JOHNSONVILLE FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING												
AUTOCAD R 2000		DATE 03/05/14		30		C		10WXXX-06			R A	

STANTEC	A
TASK COMPLETED BY:	REV NO.

PLOT FACTOR:1
W_TVA

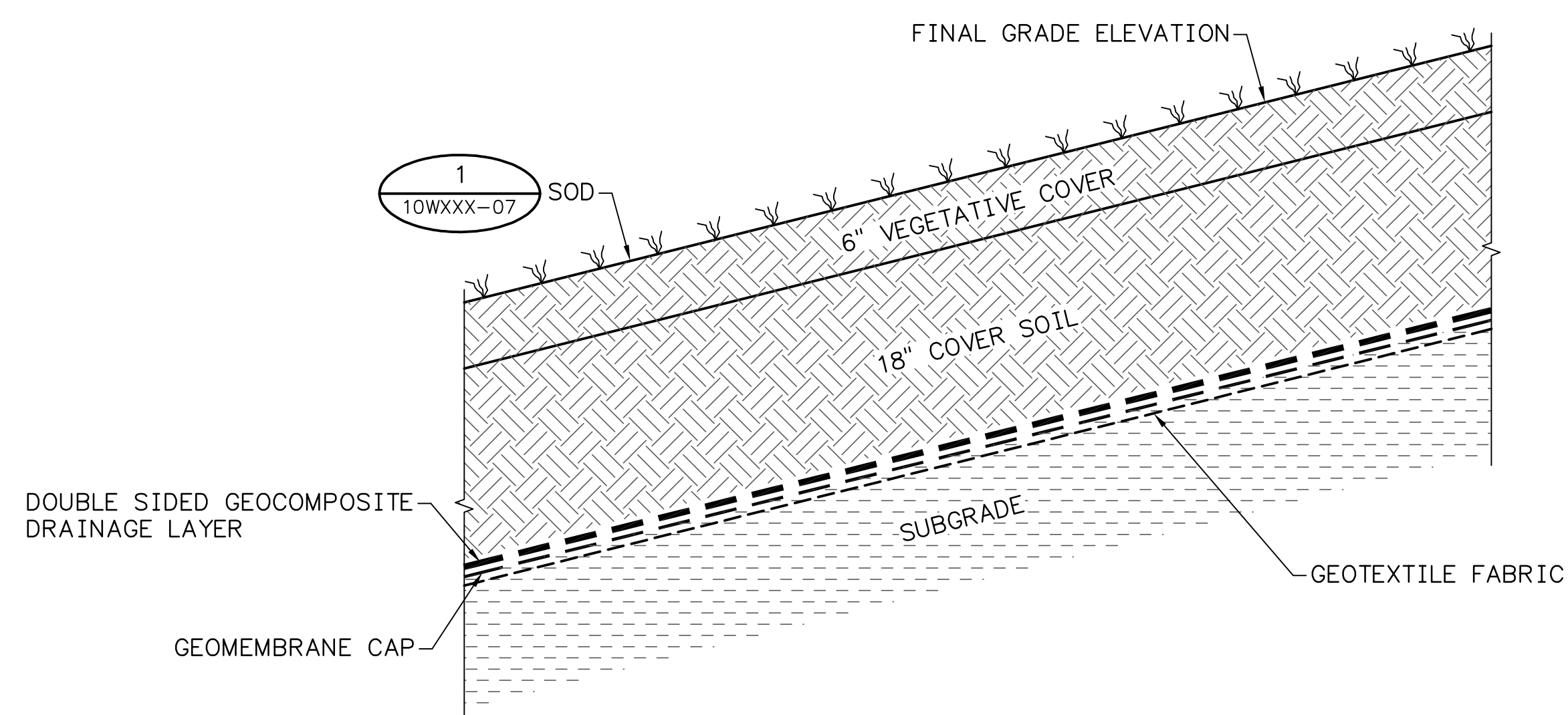
C.A.D. DRAWING
DO NOT ALTER MANUALLY

LAY SOD ACROSS THE DIRECTION OF FLOW IN A STAGGERED PATTERN. BUTT THE STRIPS TIGHTLY AGAINST EACH OTHER. DO NOT LEAVE GAPS BETWEEN ADJACENT STRIPS AND DO NOT OVERLAP.



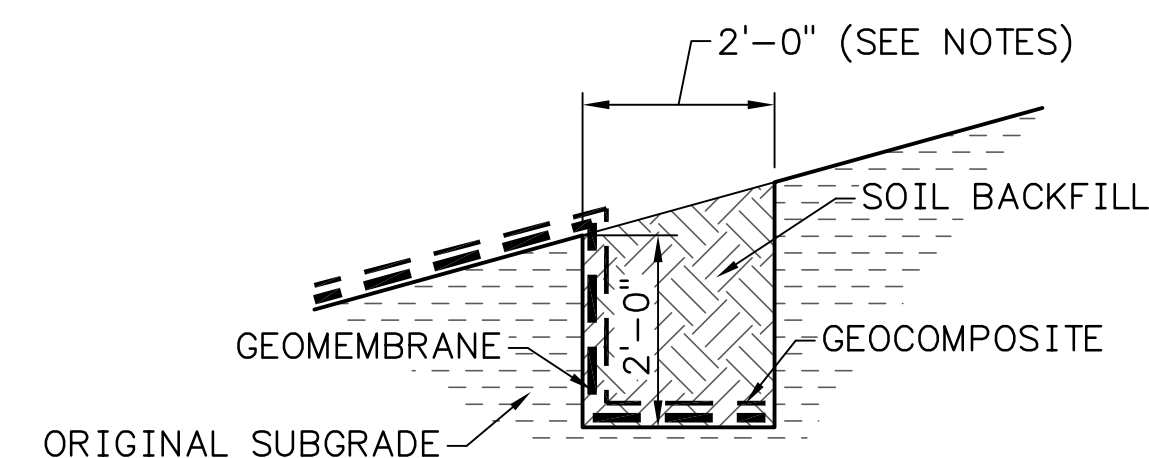
1
10WXXX-07

DETAIL - SOD INSTALLATION
NOT TO SCALE



2
10WXXX-07

DETAIL - CAP SYSTEM
SCALE: 1"=1'-0"



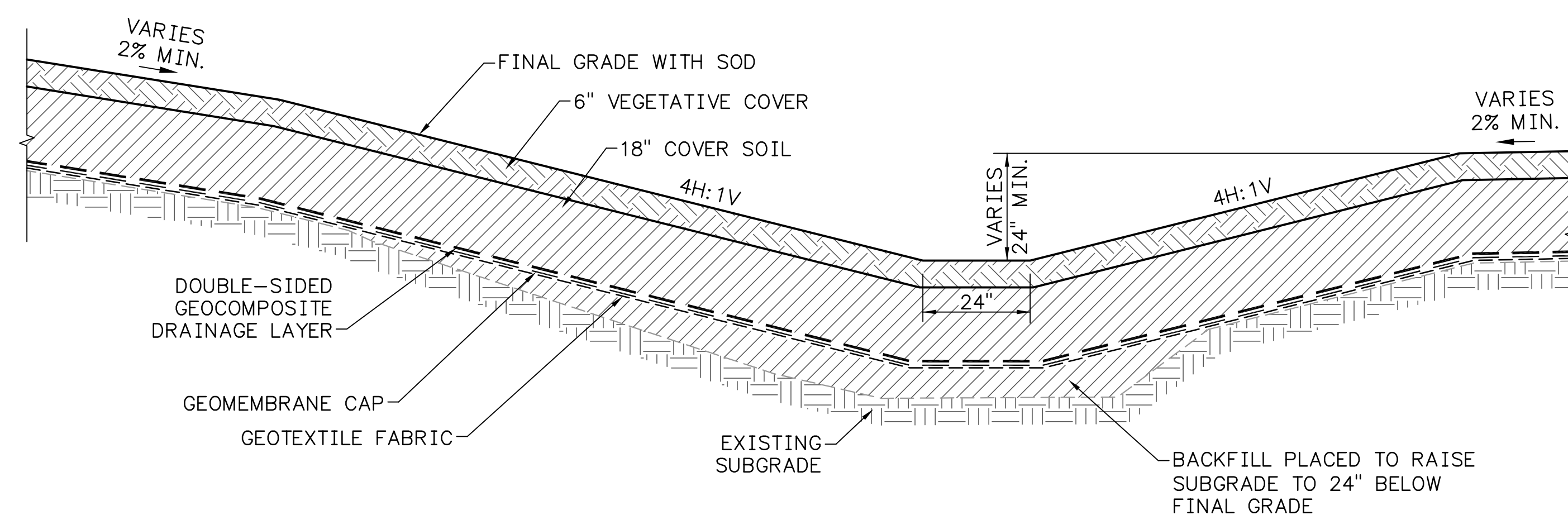
NOTES:

1. SOIL BACKFILL IN ANCHOR TRENCH SHALL HAVE NO ROCK EXCEEDING 1 INCH MAXIMUM DIMENSION.
2. SOIL BACKFILL SHALL BE COMPACTED USING MANUALLY OPERATED TAMPERS.

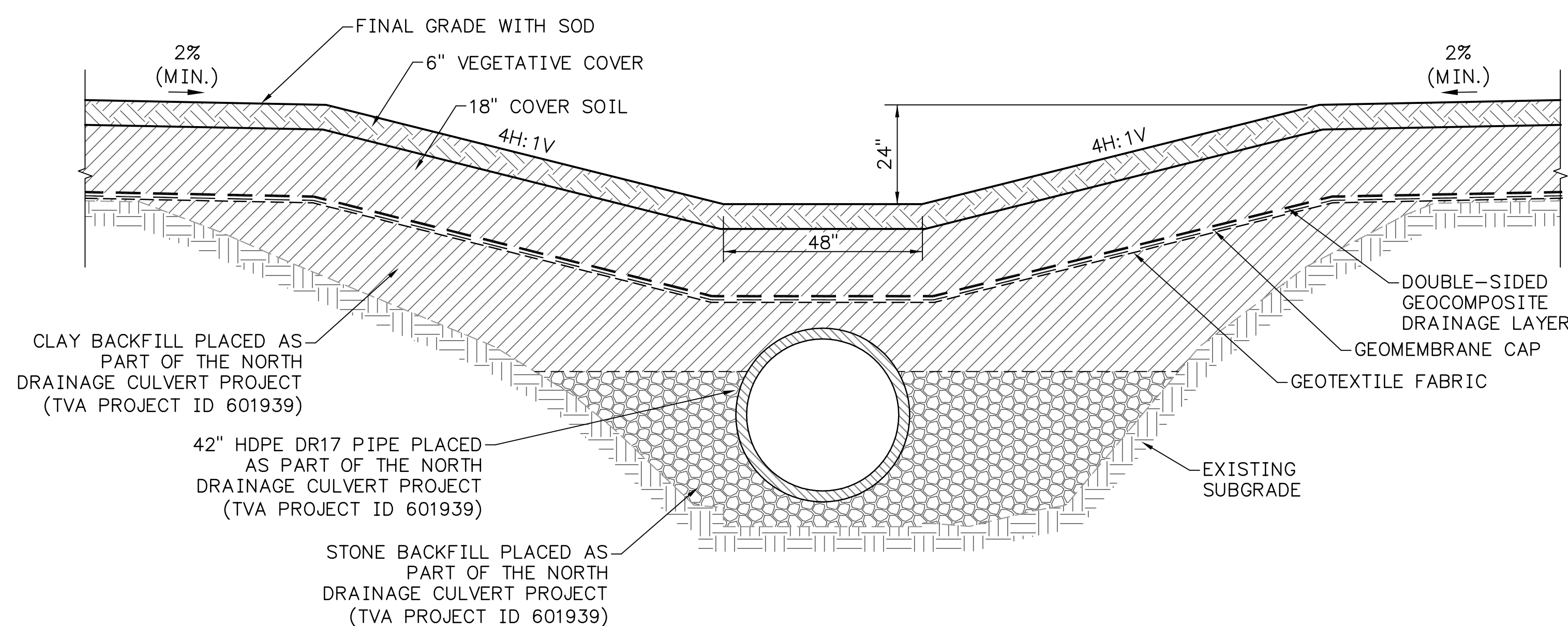
3
10WXXX-07

DETAIL - ANCHOR TRENCH

SCALE: 1/2"=1'-0"



4 TYPE I SWALE
10WXXX-07 SCALE: 1/2"=1'-0"



5 TYPE II SWALE
10WXXX-07 SCALE: 1/2"=1'-0"

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DESIGN, COMPANION, REFERENCE
DRAWINGS AND SUPPORTING
DESIGN CALCULATIONS NUMBER.

STANTEC	A
TASK COMPLETED BY:	REV NO.

PLOT FACTOR:XX
W_TVA

C.A.D. DRAWING
DO NOT ALTER MANUALLY

GENERAL NOTES

1. THESE DRAWINGS WERE PREPARED BY STANTEC CONSULTING SERVICES INC. (STANTEC) USING TOPOGRAPHIC INFORMATION PROVIDED BY TVA DATED APRIL 2012 AND DECEMBER 2013. ACTUAL CONDITIONS MAY VARY FROM THOSE SHOWN ON THESE DRAWINGS AND SHOULD BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. DEFINITIONS: WHENEVER THE FOLLOWING TERMS ARE USED IN THESE PLANS FOR CONSTRUCTION, IT IS UNDERSTOOD THAT THEY REPRESENT THE FOLLOWING:

CONTRACTOR: ENTITY RESPONSIBLE FOR CONSTRUCTION.

ENGINEER: STANTEC CONSULTING SERVICES INC. (STANTEC)

OWNER: TENNESSEE VALLEY AUTHORITY (TVA) – JOHNSONVILLE FOSSIL PLANT (JOF)

TDOT: TENNESSEE DEPARTMENT OF TRANSPORTATION AND SPECIFICALLY REFERENCES THE "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", CURRENT EDITION. ANY MATERIAL DESIGNATED AS "TDOT" IS TO CONFORM TO THE MATERIAL STANDARDS NOTED AND PLACEMENT/INSTALLATION METHODOLOGY SPECIFIED IN THE CURRENT EDITION OF THE "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN: REFERS TO A DOCUMENT THAT ESTABLISHES MINIMUM QUALITY ASSURANCE REQUIREMENTS, TESTING FREQUENCY AND QUALITY OVERSIGHT RESPONSIBILITY.

QUALITY ASSURANCE (QA) MANAGER: A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF TENNESSEE THAT IS RESPONSIBLE FOR THE QUALITY OF THE CONSTRUCTED PROJECT AS DEFINED IN THE CQA PLAN. THE QA TEAM CONSISTS OF QUALIFIED PERSONNEL THAT WORK UNDER THE DIRECT SUPERVISION OF THE QA MANAGER. QA TEAM PERSONNEL ARE INDIVIDUALS THAT ARE FAMILIAR WITH THE MATERIALS UTILIZED AND THE CONSTRUCTION COMPONENTS.
3. WHENEVER REFERENCE IS MADE TO TENNESSEE DEPARTMENT OF TRANSPORTATION (TDOT) STANDARD SPECIFICATIONS, THE AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM), AMERICAN CONCRETE INSTITUTE (ACI), OR OTHER PUBLISHED STANDARDS OR SPECIFICATIONS, IT SHALL MEAN THE LATEST VERSION IN ITS ENTIRETY.
4. THESE PLANS FOR CONSTRUCTION, ALONG WITH THE TECHNICAL SPECIFICATIONS, CQA PLAN, AND OTHER REFERENCED DOCUMENTS OR STANDARDS, SHALL CONSTITUTE THE COMPLETE CONSTRUCTION DOCUMENTS FOR THIS PROJECT.
5. THE CONTRACTOR SHALL COMMUNICATE CONSTRUCTABILITY ISSUES, DISCREPANCIES IN THE PLANS FOR CONSTRUCTION OR SPECIFICATIONS, ETC., TO THE QA MANAGER AND OWNER IMMEDIATELY UPON BECOMING AWARE. THE CONTRACTOR SHALL USE THE OWNER'S REQUEST FOR INFORMATION (RFI) FORM THAT IS CONTAINED IN THE CQA PLAN TO COMMUNICATE AND ESTABLISH WRITTEN DOCUMENTATION OF THE ISSUE AND ITS RESOLUTION.
6. THE CONTRACTOR SHALL KEEP A RECORD OF ALL DEVIATIONS IN LOCATION, ELEVATION, METHOD, OR MATERIAL USED FROM THAT SHOWN ON THESE PLANS. AT COMPLETION OF THE PROJECT A PLAN SET OF FINAL RECORD DRAWINGS SHALL BE PREPARED BY THE ENGINEER TO ENSURE THAT TVA HAS A PERMANENT RECORD OF THE PROJECT AS IT WAS CONSTRUCTED. THE CONTRACTOR SHALL COOPERATE FULLY BY PROVIDING HIS RECORD OF DEVIATIONS, AND SHALL ASSIST WITH PREPARATION OF THE FINAL RECORD DRAWINGS.
7. CONSTRUCTION ACTIVITIES SHALL BE OBSERVED BY THE QA MANAGER OR THE DESIGNATED REPRESENTATIVE ON THE QA TEAM. THE CONTRACTOR SHALL COORDINATE WITH THE ONSITE QA REPRESENTATIVE AND INFORM THE REPRESENTATIVE OF THE CONTRACTOR'S SCHEDULED WORK SHIFTS TO INSURE THAT QC REPRESENTATION OCCURS AS REQUIRED.
8. MATERIAL DELIVERIES AND HAULING FOR THIS PROJECT SHALL NOT BE PERMITTED DURING THE HOURS OF NORMAL PLANT SHIFT CHANGE (6:30 TO 7:00 A.M. AND 3:30 TO 3:45 P.M.)
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR HEALTH AND SAFETY OF ITS PERSONNEL AND SHALL MEET INDUSTRY STANDARDS REQUIREMENTS. THE CONTRACTOR SHALL ADHERE TO THE OWNER'S REQUIREMENTS FOR SAFETY DURING CONSTRUCTION.
10. THE CONTRACTOR SHALL COORDINATE WITH TVA TO LOCATE AND VERIFY ALL UTILITIES PRIOR TO COMMENCING WORK TO ENSURE THERE SHALL BE NO CONFLICT WITH THE IMPROVEMENTS PRESENTED HEREIN. ONSITE UTILITIES AND UNDERGROUND FACILITIES, WHETHER SHOWN ON THE PLANS OR NOT, SHALL BE PROTECTED BY THE CONTRACTOR FROM DAMAGE BY THE CONTRACTOR'S OPERATIONS. IF DAMAGE OCCURS THE CONTRACTOR SHALL COORDINATE REPAIRS WITH THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE THAT OCCURS.
11. EXISTING GEOTECHNICAL INSTRUMENTATION (PIEZOMETERS AND SLOPE INCLINOMETERS) IS SHOWN ON THE PLANS FOR CONSTRUCTION. THE CONTRACTOR SHALL PROTECT THIS INSTRUMENTATION FROM DAMAGE. THIS INSTRUMENTATION SHALL BE REMOVED AND HANDED OVER TO THE OWNER DURING THE COURSE OF THE WORK IF NEEDED.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF ALL ACCESS ROADS, STAGING AREAS AND STORAGE AREAS USED DURING CONSTRUCTION, AND SHALL RESTORE SAID AREAS TO THEIR ORIGINAL CONDITION, OR BETTER, ONCE CONSTRUCTION IS COMPLETE UNLESS THE OWNER GIVES WRITTEN PERMISSION TO THE CONTRACTOR TO RETAIN THE AREA "AS IS."
13. VEGETATIVE AND ORGANIC MATERIALS SHALL BE REMOVED AS DESCRIBED IN THE SPECIFICATIONS.
14. ALL PIPE REMOVAL AND TRENCHING SHALL BE CONDUCTED IN STRICT ACCORDANCE WITH APPLICABLE TVA PROCESS AND PROCEDURE REQUIREMENTS.
15. PROPOSED STAGING AND STOCKPILE STORAGE AREAS ARE SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER (TVA) REGARDING USE OF THESE AREAS, AND OF ANY OTHER LOCATIONS PROPOSED BY THE CONTRACTOR. STAGING AND STOCKPILE STORAGE AREAS SHALL BE APPROVED BY THE OWNER.

16. STOCKPILES SHALL BE GRADED TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES. THE SIDE SLOPES SHALL HAVE MAXIMUM 3H:1V SLOPE. THE TOP OF THE STOCKPILE SHALL HAVE A MINIMUM TWO PERCENT SLOPE. MATERIALS SHALL BE SEGREGATED AS DIRECTED BY THE QC MANAGER.
17. FINAL EMBANKMENT SURFACES SHALL BE FINISHED TO A RELATIVELY SMOOTH AND COMPACT SURFACE. CONTRACTOR SHALL REVEGETATE SLOPE WITH SOD.

SOD SHALL BE PLACED AS SHOWN ON THESE PLANS FOR CONSTRUCTION AND SHALL BE IN ACCORDANCE WITH THE TENNESSEE EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.
18. GEOTEXTILES USED FOR CONSTRUCTION SHALL BE CERTIFIED BY THE MANUFACTURER AS CONFORMING TO THE PROJECT REQUIREMENTS. GEOTEXTILES SHALL NOT BE UTILIZED AS A FILTER UNLESS APPROVED BY TVA. IT MAY BE USED AS A TEMPORARY MEASURE AND REMOVED.
19. ALL SURFACES SHALL BE APPROVED BY THE QA MANAGER OR THE DESIGNATED REPRESENTATIVE ON THE QA TEAM PRIOR TO EMBANKMENT OR LINEAR CONSTRUCTION.
20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION SURVEYOR SELECTION AND COORDINATION OF ALL CONSTRUCTION RELATED SURVEYING. ALL ESTABLISHED TVA BENCH MARKS OR OTHER MONUMENTS SHALL BE PRESERVED AND PROTECTED. ANY ESTABLISHED MARKER OR BENCHMARK THAT IS DAMAGED BY CONSTRUCTION ACTIVITIES SHALL BE REPLACED BY TVA SURVEYING SERVICES AT THE CONTRACTOR'S EXPENSE.

EROSION PREVENTION AND SEDIMENT CONTROL (EPSC)

1. THE CONTRACTOR SHALL EXERCISE EVERY REASONABLE PRECAUTION AT ALL TIMES TO MINIMIZE SOIL EROSION AND PREVENT WATER POLLUTION BY DEPOSITION OF SEDIMENT INTO THE ADJACENT WATERWAYS. SOIL EROSION AND SEDIMENT CONTROLS MUST BE USED AND MAINTAINED IN EFFECTIVE OPERATING CONDITION DURING CONSTRUCTION, AND EXPOSED SOIL AND OTHER FILL MUST BE PERMANENTLY STABILIZED AT THE EARLIEST PRACTICABLE DATE.
2. SILT FENCES SHALL BE INSTALLED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES IN ANY AREA WHERE THEY ARE SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL INSPECT THE SILT FENCE FOR DAMAGE AND SEDIMENT BUILDUP EVERY 7 DAYS AND WITHIN 24 HOURS OF A PRECIPITATION EVENT THAT PRODUCES 1/2-INCH OR MORE OF RAINFALL. IF THE FENCE FABRIC IS UNDERMINED, TORN, OR IN ANY WAY BECOMES INEFFECTIVE, IT SHALL BE IMMEDIATELY REPAIRED OR REPLACED BY THE CONTRACTOR. SILT FENCES REMOVED TO PROVIDE ACCESS FOR EQUIPMENT AND VEHICLES SHALL BE REPLACED AT THE END OF THE WORK DAY.
3. ROCK BERMS SHALL BE CONSTRUCTED OF QUARRIED CRUSHED STONE PRIOR TO PERFORMING ANY EXCAVATION OR PIPE REMOVAL ACTIVITIES BELOW THE WATER LEVEL OF KENTUCKY LAKE. ROCK BERMS ARE CONSIDERED TEMPORARY FILLS AND SHALL BE REMOVED TO THE APPROXIMATE PRE-CONSTRUCTION ELEVATIONS.
4. THE CONTRACTOR SHALL ALSO EXERCISE EVERY PRECAUTION AT ALL TIMES TO PREVENT WATER POLLUTION BY NON-STORMWATER DISCHARGES, INCLUDING SPILLS OR RELEASES OF HAZARDOUS MATERIALS.
5. THE CONTRACTOR IS RESPONSIBLE FOR SITE DRAINAGE THROUGHOUT CONSTRUCTION AND SHALL INSTALL TEMPORARY DRAINAGE STRUCTURES OR PUMP WATER AS NECESSARY TO PREVENT INTERFERENCE WITH THE WORK. SUCH TEMPORARY DRAINAGE FEATURES SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF ENVIRONMENTAL PERMITS AND THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP). THE CONTRACTOR SHALL PREPARE A PLAN AND ISSUE TO THE CQA MANAGER FOR REVIEW AND APPROVAL PRIOR TO IMPLEMENTATION.
6. MATERIALS DELIVERED FOR INCORPORATION INTO THE WORK SHALL BE TEMPORARILY STORED IN AREAS SELECTED BY THE CONTRACTOR AND APPROVED BY THE OWNER. MATERIALS SHALL BE STORED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
7. THE EROSION AND SEDIMENT CONTROL MEASURES SHOWN SHALL BE CONSIDERED THE MINIMUM; SUPPLEMENTAL MEASURES SHALL BE PROVIDED BY THE CONTRACTOR AS FIELD CONDITIONS DICTATE.
8. DURING CONSTRUCTION, THE CONTRACTOR SHALL INSPECT, CLEAN, AND MAINTAIN ALL SEDIMENT CONTROL DEVICES AS SHOWN ON THE PLANS FOR CONSTRUCTION AND PROVIDE REPORTING AS REQUIRED BY THE SPECIFICATIONS AND REGULATIONS ON SAID ITEMS.
9. THE CONTRACTOR SHALL CONTROL FUGITIVE DUST EMISSIONS DURING CONSTRUCTION IN SUCH A MANNER AS TO COMPLY WITH APPLICABLE REGULATIONS. DUST CONTROL MEASURES SHALL BE SUBJECT TO APPROVAL OF THE QA MANAGER AND THE OWNER.
10. SOIL STOCKPILES THAT WILL NOT BE DISTURBED FOR 14 DAYS OR MORE SHALL BE TEMPORARILY SEEDED WITH WHEAT OR RYE AT A RATE OF 60 LBS/ACRE AND SHALL BE COVERED WITH MULCH.

10% CONCEPTUAL DESIGN
ISSUED FOR REVIEW
NOT FOR CONSTRUCTION



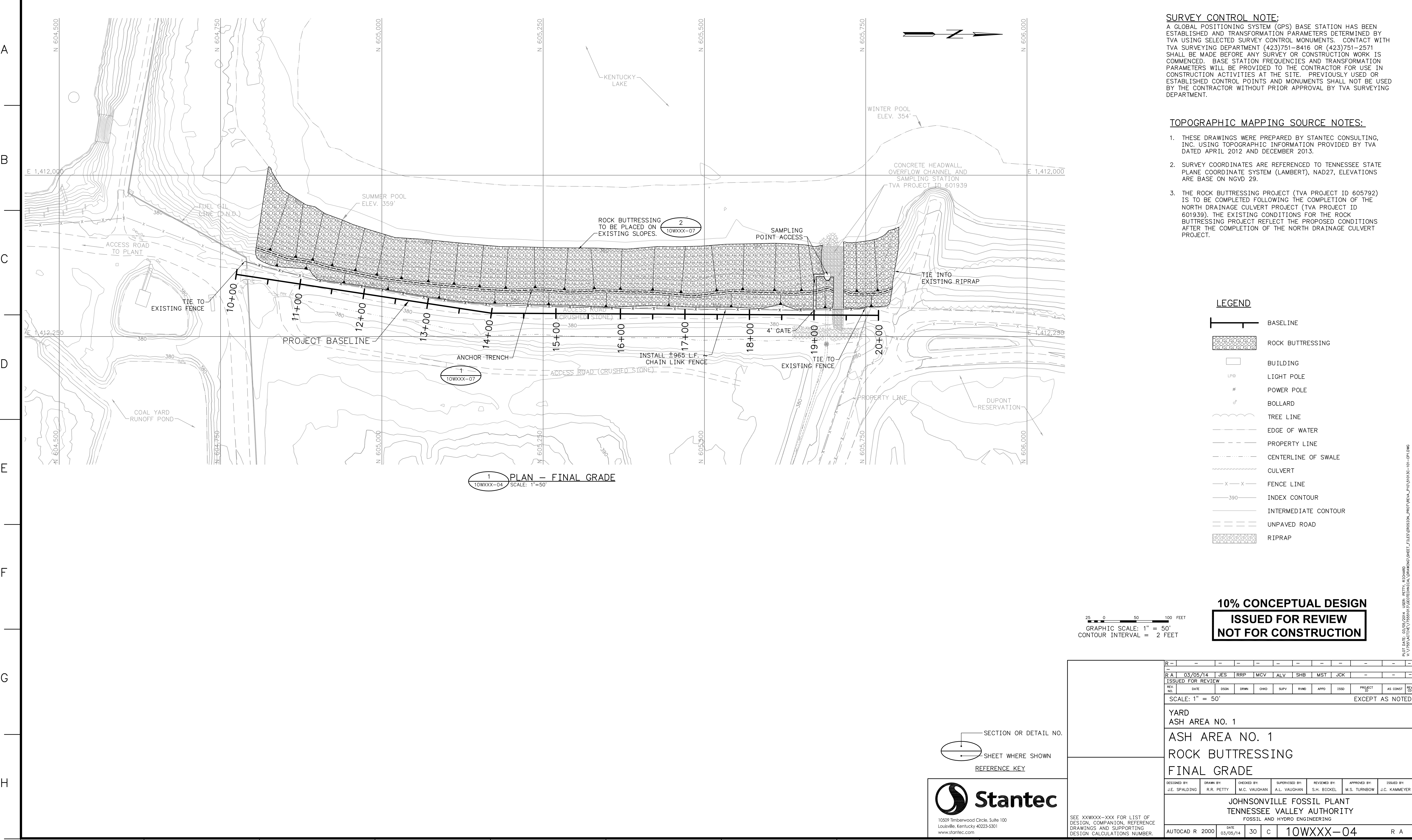
Stantec

10559 Timberwood Circle, Suite 100
Louisville, Kentucky 40223-5301
www.stantec.com

SEE XXWXXX-XXX FOR LIST OF DESIGN, COMPANION, REFERENCE DRAWINGS AND SUPPORTING DESIGN CALCULATIONS NUMBER.

R - - - - - - - - - -									
RA	03/05/14	JES	RRP	MGV	ALV	SHB	MST	JCK	-
ISSUED FOR REVIEW									
REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT ID
SCALE: NONE EXCEPT AS NOTED									
YARD									
ASH AREA NO. 1									
ASH AREA NO. 1									
ROCK BUTTRESSING									
GENERAL NOTES									
DESIGNED BY: J.E. SPALDING	DRAWN BY: R.R. PETTY	CHECKED BY: M.C. VAUGHAN	SUPERVISED BY: A.L. VANCE	REVIEWED BY: S.H. BICKEL	APPROVED BY: M.S. TURNBOW	ISSUED BY: J.C. KAMMEYER			
JOHNSONVILLE FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING									
AUTOCAD R 2000	DATE 03/05/14	30	C	10WXXX-02				R A	

STANTEC	A
TASK COMPLETED BY:	REV NO.



SURVEY CONTROL NOTE:
A GLOBAL POSITIONING SYSTEM (GPS) BASE STATION HAS BEEN ESTABLISHED AND TRANSFORMATION PARAMETERS DETERMINED BY TVA USING SELECTED SURVEY CONTROL MONUMENTS. CONTACT WITH TVA SURVEYING DEPARTMENT (423)751-8416 OR (423)751-2571 SHALL BE MADE BEFORE ANY SURVEY OR CONSTRUCTION WORK IS COMMENCED. BASE STATION FREQUENCIES AND TRANSFORMATION PARAMETERS WILL BE PROVIDED TO THE CONTRACTOR FOR USE IN CONSTRUCTION ACTIVITIES AT THE SITE. PREVIOUSLY USED OR ESTABLISHED CONTROL POINTS AND MONUMENTS SHALL NOT BE USED BY THE CONTRACTOR WITHOUT PRIOR APPROVAL BY TVA SURVEYING DEPARTMENT.

TOPOGRAPHIC MAPPING SOURCE NOTES:

- THESE DRAWINGS WERE PREPARED BY STANTEC CONSULTING, INC. USING TOPOGRAPHIC INFORMATION PROVIDED BY TVA DATED APRIL 2012 AND DECEMBER 2013.
- SURVEY COORDINATES ARE REFERENCED TO TENNESSEE STATE PLANE COORDINATE SYSTEM (LAMBERT), NAD27, ELEVATIONS ARE BASE ON NGVD 29.
- THE ROCK BUTTRESSING PROJECT (TVA PROJECT ID 605792) IS TO BE COMPLETED FOLLOWING THE COMPLETION OF THE NORTH DRAINAGE CULVERT PROJECT (TVA PROJECT ID 601939). THE EXISTING CONDITIONS FOR THE ROCK BUTTRESSING PROJECT REFLECT THE PROPOSED CONDITIONS AFTER THE COMPLETION OF THE NORTH DRAINAGE CULVERT PROJECT.

LEGEND

- BASELINE
- ROCK BUTTRESSING
- BUILDING
- LIGHT POLE
- POWER POLE
- BOLLARD
- TREE LINE
- EDGE OF WATER
- PROPERTY LINE
- CENTERLINE OF SWALE
- CULVERT
- FENCE LINE
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- UNPAVED ROAD
- RIPRAP

10% CONCEPTUAL DESIGN
ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

GRAPHIC SCALE: 1" = 50'
CONTOUR INTERVAL = 2 FEET

SECTION OR DETAIL NO.
SHEET WHERE SHOWN
REFERENCE KEY



SEE XXXXXX-XXX FOR LIST OF DESIGN, COMPANION, REFERENCE DRAWINGS AND SUPPORTING DESIGN CALCULATIONS NUMBER.

R A		03/05/14		JES	RRP	MCV	ALV	SHB	MST	JCK	-		-		-	
ISSUED FOR REVIEW																
REV. NO.	DATE		DSGN	DRWN	CHGD	SUPV	RWVD	APPD	ISSD	PROJECT ID		AS CONST		REV. NO.		
SCALE: 1" = 50'																
EXCEPT AS NOTED																
YARD																
ASH AREA NO. 1																
ASH AREA NO. 1																
ROCK BUTTRESSING																
FINAL GRADE																
DESIGNED BY: J.E. SPALDING		DRAWN BY: R.R. PETTY		CHECKED BY: M.C. VAUGHAN		SUPERVISED BY: A.L. VAUGHAN		REVIEWED BY: S.H. BICKEL		APPROVED BY: M.S. TURNBOW		ISSUED BY: J.C. KAMMEYER				
JOHNSONVILLE FOSSIL PLANT																
TENNESSEE VALLEY AUTHORITY																
FOSSIL AND HYDRO ENGINEERING																
AUTOCAD R 2000		DATE 03/05/14		30	C	10WXXX-04						R A				

Attachment C

Risk Matrix

TVA CONFIDENTIAL INFORMATION

TITLE: 601939 – JOF – Ash Area No 1 North Drainage Culvert; 605790 – JOF – Ash Area No 1 Cap Installation; 605792 – JOF – Ash Area No 1 Rock Buttreassing

No.	Risk Event	Likelihood	Risk Level	Cost Impact			Schedule Impact			Risk Management Method				Risk Mitigation Plan	COST BASIS
				Best Case	Most Likely	Worst Case	Best Case	Most Likely	Worst Case	Avoid	Transfer	Mitigate	Assume		
	<u>Phase 2 Approval Process</u>														
2.1	Delay in Phase 2 approval.	Very Likely	Low	\$10,000	\$20,000	\$30,000	4 wks	8 wks	12 wks				x	Prepare timely PPD documents for Board Approval meetings.	Total project cost less than \$50 M therefore typical approval process. Add \$2,500/wk for delay.
2.2	Revise PPD and Change Design Alternative.	Very Unlikely	Low	\$40,000	\$60,000	\$80,000	4 wks	6 wks	8 wks				x	Coordination with JPT during Phase 1.	Assume \$10,000/wk for design.
2.3	Additional project reviews required.	Likely	Low	\$0	\$10,000	\$20,000	0	4 wks	8 wks				x	Additional revisions to Phase 1 planning documents are likely prior to Phase 2.	Assume \$2,500/wk for delay.
2.4	Funding not available or only partially available.	Unlikely	Low	\$0	\$10,000	\$20,000	0 mo	4 wks	8 wks				x	The Phase 1 planning documents are intended to mitigate risk of insufficient project funding.	Schedule impact is for project shut-down and later re-start. Add \$2,500/wk for delay.
	<u>Design</u>														
2.5	Engineering Design Fee greater than proposed fee.	Unlikely	Medium	\$0	\$75,000	\$150,000	1 mo	2 mo	3 mo				x	Agree upon detailed scope prior to starting. Monitor project costs.	Preliminary estimated Ph. 2 design cost of \$750,000 for all 3 projects. Best Case no variance, 10% variance Most Likely, 20% variance Worst Case.
2.6	Late design finish.	Unlikely	Medium	\$0	\$0	\$0	0	2 wks	2 mo			x		Schedule monitoring	Assume no major changes to original design Scope of Work, therefore only the schedule will be impacted.
2.7	Design changes based on regulatory comments increases schedule duration.	Likely	Low	\$5,000	\$10,000	\$60,000	2 wks	1 mo	6 mo				x	Meet w/ regulators in advance and during process to attempt to confirm what regulators will want to see.	Add \$2,500/wk during design phase.
2.8	Borrow site availability issues.	Very Unlikely	Medium	\$0	\$0	\$250,000	0	0	10 wks				x	Phase 1 borrow study identified a nearby borrow area with adequate quantity and quality soils.	Best case and most likely case assumes suitable quantity and quality of borrow material. Worst Case requires additional borrow study be performed.
2.9	Sequencing of construction propagates additional design work.	Unlikely	Low	\$0	\$20,000	\$40,000	0 mo	4 wks	8 wks			x		Maintain communication with JPT and within TVA on other initiatives at JOF.	Most likely outcome: the proposed design will be sufficient or require minor modifications. Worst case includes re-design of closure estimated at \$5,000/wk.
	<u>Permitting/Environmental</u>														
2.10	Environmental review completion delay.	Very Unlikely	Medium	\$0	\$10,000	\$60,000	0	1 mo	6 mo				x	CEC will be performed. NPDES modification will be required with TDEC.	Assume approximately \$2,500/wk for delay time. Most Likely will be one month delay and Worst Case 6 months.
2.11	Regulations change (ie TDEC regulations change).	Likely	Low	\$0	\$0	\$30,000	0	0	2 wks				x	Compliance with Subtitle "D" regulations will reduce potential for risk.	New regulations could impact ash ponds/stacks which store ash. Approx. \$15K/week during design phase.
2.12	TDEC will require a site specific groundwater monitoring plan.	Unlikely	Low	\$0	\$0	\$60,000	0	0	1 mo				x	Early communication with TDEC on the process.	New requirements could impact ash ponds/stacks which store ash. Approx. \$15K/week during design phase.
2.13	Processing and review of SWPPP creates delays.	Unlikely	Low	\$0	\$0	\$60,000	0	0	1 mo				x	Design team will work closely with water quality staff to resolve issues in a timely manner.	Approx. \$15K/week during design phase.
2.14	401/404 Floodplain Permitting/Mitigation.	Very Unlikely	Medium	\$0	\$0	\$300,000	0	0	1 mo				x	CEC and other environmental mitigation to be performed in earlier phases. Permitting required will be included in estimated cost during Phase 2.	Worst case assumes additional permitting fees and costs.
2.15	Environmental findings create delays.	Unlikely	Low	\$0	\$20,000	\$40,000	0	2 mo	4 mo				x	CEC will be performed prior to Phase 2 design to identify potential issues that may cause a delay.	Approx. \$2,500/week during design phase.
	<u>Public</u>														
2.16	Public/political opposition.	Unlikely	Low	\$0	\$60,000	\$120,000	0	1 mo	2 mo			x		Team will address this potential outcome with environmental coordinator, outreach personnel, and/or legal department.	Approx. \$15,000/week during design phase. Minimal legal input is the most likely outcome, additional coordination is assumed worst case scenario.

TITLE: 601939 – JOF – Ash Area No 1 North Drainage Culvert; 605790 – JOF – Ash Area No 1 Cap Installation; 605792 – JOF – Ash Area No 1 Rock Buttreassing

No.	Risk Event	Likelihood	Risk Level	Cost Impact			Schedule Impact			Risk Management Method				Risk Mitigation Plan	COST BASIS
				Best Case	Most Likely	Worst Case	Best Case	Most Likely	Worst Case	Avoid	Transfer	Mitigate	Assume		
2.17	Lawsuit to stop project.	Unlikely	High	\$0	\$60,000	\$120,000	0	1 mo	2 mo			x		Team will address this potential outcome with environmental coordinator, outreach personnel, and/or legal department.	Approx. \$15,000/week during design phase. Minimal legal input is the most likely outcome, additional coordination is assumed worst case scenario.
	Other														
2.18	Construction bidding process delays.	Unlikely	Low	\$0	\$40,000	\$80,000	0	1 mo	2 mo			x		Contractor will be involved in design reviews and will have input into schedule and constructability issues.	Extend project tracking / management / coordination time @ \$10,000/wk for up to 8 wks.
2.19	Natural Disasters.	Very Unlikely	Low	\$0	\$0	\$20,000	0	0	2 wks				x		Extend project tracking / management / coordination time @ \$10,000/wk

Mid Points are: Very Unlikely 5%; Unlikely 25%; Likely 60%; Very Likely 85%; Imminent 95%.

TVA CONFIDENTIAL INFORMATION

TITLE: 601939 – JOF – Ash Area No 1 North Drainage Culvert; 605790 – JOF – Ash Area No 1 Cap Installation; 605792 – JOF – Ash Area No 1 Rock Buttreassing

No.	Risk Event	Likelihood	Risk Level	Cost Impact			Schedule Impact			Risk Management Method				Risk Mitigation Plan	COST BASIS
				Best Case	Most Likely	Worst Case	Best Case	Most Likely	Worst Case	Avoid	Transfer	Mitigate	Assume		
	<u>Phase 3 Approval Process</u>														
3.1	Delay in Phase 3 approval.	Very Likely	Low	\$0	\$40,000	\$80,000	0	1 mo	2 mo				x		Extend project tracking / management / coordination time @ \$10,000/wk
3.2	Construction bid cost variance from Engineer's Opinion of Probable Construction Cost.	Unlikely	Medium	TBD	TBD	TBD	0	0	0				x	Prepare detailed engineer's construction cost estimate with contingencies and risk matrix assessment to mitigate risks. Perform constructability review with contractor.	Capital cost TBD based on selected alternatives. Assume Best Case Bid Variance is -10%, Mostly Likely 0%, and Worst Cast +10%.
	<u>Construction</u>														
3.3	Unexpected conditions or underground obstructions encountered.	Likely	Medium	\$0	\$100,000	\$300,000	0	1 mo	3 mo			x		Field survey was updated during Phase 1 design, contractor will notify as soon as additional features are located.	Assume \$100,000 per month additional contractor cost.
3.4	Weather impacts delay construction activities.	Likely	Low	\$0	\$100,000	\$200,000	0	1 mo	2 mo			x		Plan for inclement weather delays during fall and early winter months. Maintain design and construction schedule to prevent construction from extending into undesirable work seasons.	Assume \$100,000/month standing time due to equipment and labor costs.
3.5	Environmental violations due to release of contaminants from construction equipment.	Very Unlikely	Low	\$0	\$3,000	\$6,000	0	1d	1wk			x		Comply with CBMPP for project and maintain spill prevention controls on site.	Worst case soil cleanup/excavation and offsite disposal required.
3.6	Human Performance or Safety Issues potential to shut down job.	Unlikely	Low	\$0	\$20,000	\$50,000	0	2d	1wk			x		Safety programs are required for all contractors working for TVA to reduce risk. TVA reviews all contractor's safety program prior to performing work.	Estimated downtime costs @ \$10,000/day for equipment and labor.
3.7	Unavailability / Unreliability of construction equipment.	Very Unlikely	Low	\$0	\$0	\$0	0	0	0				x	Assume construction equipment delays should be accommodated by project schedule and available float.	Construction equipment delays not anticipated to increase project costs.
3.8	Craft availability issues due to multiple TVA sites in outage simultaneously, as well as private sector requirements.	Very Unlikely	Low	\$0	\$0	\$0	0	0	0				x	Assume adequate construction contractors and staffing exists.	Craft availability issues not anticipated.
3.9	Unauthorized personnel access the site during construction.	Likely	Low	\$0	\$5,000	\$50,000	0	0	1wk				x	Existing On-site TVA facility with required security features assumed to already be in-place.	Best Case - assume security accounted for in original construction bid. Most Likely - add additional design of fence upgrades. Worst case- additional unexpected security issues/upgrades.
3.10	Natural Disasters.	Likely	Medium	\$0	\$30,000	\$60,000	0	2 wk	1 mo				x		Assume worst case one month idle time, contractor remobilization @ \$10,000 plus \$50,000 in site damage.
3.11	Chlorine or other release from DuPont.	Likely	High	\$0	\$20,000	\$50,000	0	2d	1wk			x		Coordinate with DuPont Plant for protocol on releases prior to beginning construction.	Estimated downtime costs @ \$10,000/day for equipment and labor.
3.12	Stability issues of working on wet/soft ground conditions with construction equipment.	Likely	Low	\$0	\$100,000	\$200,000	0	2 wks	4 wks			x		Cost of stabilizing soft ash/subgrade during construction was added into the Phase 2 estimate.	Best and worst case is more area is needed to be stabilized during construction than planned.
3.13	Temporary Dike Instability.	Very Unlikely	Medium	\$0	\$25,000	\$50,000	0	2 wk	1 mo				x	Minimize excavation into the dike when removing sections of the existing pipe. Provide temporary stabilization until final stabilization efforts can be achieved.	Repair work to dike will be required if slide occurs. Additional earthwork and stabilization efforts would be required. This would result in project delays an estimated cost overrun of \$12,500/wk.
3.14	Damage to Steam Line.	Very Unlikely	High	\$0	\$20,000	\$50,000	0	2d	1wk			x			Estimated downtime costs @ \$10,000/day for equipment and labor.
3.15	Damage to Fuel Oil Line.	Very Unlikely	Medium	\$0	\$20,000	\$50,000	0	2d	1wk			x			Estimated downtime costs @ \$10,000/day for equipment and labor.

TITLE: 601939 – JOF – Ash Area No 1 North Drainage Culvert; 605790 – JOF – Ash Area No 1 Cap Installation; 605792 – JOF – Ash Area No 1 Rock Buttreassing

No.	Risk Event	Likelihood	Risk Level	Cost Impact			Schedule Impact			Risk Management Method				Risk Mitigation Plan	COST BASIS
				Best Case	Most Likely	Worst Case	Best Case	Most Likely	Worst Case	Avoid	Transfer	Mitigate	Assume		
3.16	Construction quality issues.	Unlikely	Low	\$0	\$100,000	\$200,000	0	1 mo	2 mo			x			Assume \$100,000/month due to re-work.
3.17	Long lead time for materials and equipment deliveries.	Unlikely	Medium	\$0	\$0	\$0	0	1 wk	1 mo		x	x		Materials and equipment availability will be address in Phase 2 design and will be revisited during the bidding process. Risk will be transferred to contractor.	Limited amount of items to create problems. However the liner supply or its installation have potential for delay. Transfer risk of schedule cost delays to contractor.

TITLE: 601939 – JOF – Ash Area No 1 North Drainage Culvert; 605790 – JOF – Ash Area No 1 Cap Installation; 605792 – JOF – Ash Area No 1 Rock Buttreassing

No.	Risk Event	Likelihood	Risk Level	Cost Impact			Schedule Impact			Risk Management Method				Risk Mitigation Plan	COST BASIS
				Best Case	Most Likely	Worst Case	Best Case	Most Likely	Worst Case	Avoid	Transfer	Mitigate	Assume		
	Environmental														
3.18	Contaminated Waste Encountered with excavating and regrading.	Unlikely	Medium	\$0	\$0	\$700,000	0	0	12 mo				x		Waste Sampled, Tested, Containerized and shipped to a Hazardous Waste Landfill assumed (\$500,000). One year construction down time @ \$200,000.
3.19	TDEC enforcement activities.	Unlikely	Medium	\$0	\$10,000	\$100,000	0 mo	2mo	4 mo			x		Design of cap and storm water management system to comply with and consider effluent water quality.	Worst case is need to revise design and re-permit storm water management system and implement changes in the field.
3.20	SWPPP compliance and closure causes problems and delays.	Likely	High	\$0	\$100,000	\$700,000	0	1 yr	1 yr			x		Cost will be mitigated by using sod to reduce time to keep SWPPP open or including cost for additional year of SWPPP inspections.	Best case is additional year of SWPPP inspections, labor cost. Worst case is use sod instead of seeding.

Mid Points are: **Very Unlikely** 5%; **Unlikely** 25%; **Likely** 60%; **Very Likely** 85%; **Imminent** 95%.

Attachment D

Preliminary Construction
Cost Opinion

TVA CONFIDENTIAL INFORMATION

<u>Project</u>	<u>Alternative</u>	<u>Cost</u>	<u>Cost Plus 30% Contingency</u>
North Drainage Culvert	Alternative A.1.a	\$ 1,038,000	\$ 1,350,000
North Drainage Culvert	Alternative A.1.b	\$ 589,500	\$ 770,000
North Drainage Culvert	Alternative A.2	\$ 520,700	\$ 680,000
North Drainage Culvert	Alternative B.1	\$ 59,050	\$ 80,000
North Drainage Culvert	Alternative B.2	\$ 80,790	\$ 110,000
North Drainage Culvert	Alternative B.3.a	\$ 248,900	\$ 330,000
North Drainage Culvert	Alternative B.3.b	\$ 494,900	\$ 650,000
Rock Buttreassing	Alternative 1	\$ 739,150	\$ 970,000
Rock Buttreassing	Alternative 2	\$ 586,900	\$ 770,000
Cap Installation	Alternative 1	\$ 2,916,000	\$ 3,800,000
Cap Installation	Alternative 2	\$ 3,306,000	\$ 4,300,000

CALCULATION SHEET DRAFT	PROJECT	TVA CONFIDENTIAL INFORMATION			SHEET		REV. NO.		
	North Drainage Culvert			PLANT NAME:		2 of 2		A	
	SUBJECT			IMPOUNDMENT NAME:		CLIENT PROJECT #	CONSULTANT JOB NO.		
	Conceptual Construction Cost Estimate			Ash Area No. 1		601939	175551013		
	ACTIVITY	ESTIMATE ID#:		LAST UPDATED BY:	DATE LAST MODIFIED:	REVIEWED BY:			
	Detailed Cost Estimate	Alternative A.1.a		JES	02/11/14				
BASIS OF THE ESTIMATE				POND/STACK DETAILS					
YEAR			2014	DOES THE POND/STACK HAVE A LINER SYSTEM?				NO	
TOTAL AREA OF DISTURBANCE (FACILITY AREA)			3.0	Acres	TYPE OF POND/STACK LINER SYSTEM				N/A
OVERALL POND/STACK SIZE			16.0	Acres	ASSUMED THICKNESS OF EMPLACED ASH AT CLOSURE (FT)				TBD
					Alternative A.1.a				
	TASK	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	NOTES		
MOBILIZATION/ SITE PREP	MOBILIZATION / SITE PREP								
	1	MOBILIZATION	LS	2.5% of Total Estimate	1	\$26,000	Mob/Demob & insurance: Includes administration (meetings, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup). 2.5% of Construction Sub-Total.		
	2	REMOVE ORGANICS	ACRE	\$1,500	3	\$4,500	Remove organic materials and mulch left over from clearing operations. Cost based on TVA Ash Pond Closure Template.		
EARTHWORK	EARTHWORK								
	3	FINISH GRADING	ACRE	\$4,500	3	\$13,500	Finish grading of soil fill. Unit cost based on 2013 RSMeans Section 31 22 16.10 Item 0100.		
	4	SOD	ACRE	\$15,000	1	\$15,000	Unit cost based on actual cost of sod installation for the DuPond Dredge Cell Closure project.		
	5	PLACE SOIL FILL IN THE EXISTING EAST CHANNEL	CYD	\$18	2,500	\$45,000	General fill from off-site borrow source. Includes excavation, hauling, and placement. Unit cost based on TVA Ash Pond Closure Template and RSMeans Section 31 23 23.20 Item 1238 for 10 mile round-trip hauling distance.		
SITE WORK / SITE RESTORATION	ROADS								
	6	CONSTRUCTION ENTRANCES	EACH	\$15,000	2	\$30,000	Entrance for heavy construction equipment and vehicles to enter the site and cross the fuel oil line. Unit costs estimated by Stantec.		
	SURFACE DRAINAGE								
	7	ARTICULATED BLOCK CHANNEL LINING	SY	\$120	7,000	\$840,000	A precast concrete block mat system for channel lining. Includes material and installation. Unit cost based on information provided by suppliers.		
	8	40-MIL LLDPE GEOMEMBRANE	SQ. FT.	\$0.45	60,000	\$27,000	Unit cost based on TVA Ash Pond Closure Template.		
	9	GEOTEXTILE	SQ. FT.	\$0.20	60,000	\$12,000	Geotextile cushion between residuals and cap. Unit cost based on TVA Ash Pond Closure Template.		
	SITE RESTORATION								
	10	EROSION PREVENTION AND SEDIMENT CONTROL	LS	\$25,000	1	\$25,000	Installation of erosion control features (silt fences, rock check walls, etc.).		
OTHER SITE SPECIFIC ITEMS	OTHER SITE SPECIFIC ITEMS								
				TOTAL		\$ 1,038,000			

CALCULATION SHEET DRAFT	PROJECT	IDENTIFICATION INFORMATION		SHEET	REV. NO.
	North Drainage Culvert	Johnsonville Fossil Plant		2 of 2	A
	SUBJECT	IMPOUNDMENT NAME:		CLIENT PROJECT #	CONSULTANT JOB NO.
	Conceptual Construction Cost Estimate	Ash Area No. 1		601939	175551013
	ACTIVITY	ESTIMATE ID#:	LAST UPDATED BY:	DATE LAST MODIFIED:	REVIEWED BY:
	Detailed Cost Estimate	Alternative A.1.b	JES	02/11/14	

BASIS OF THE ESTIMATE		POND/STACK DETAILS	
YEAR	2014	DOES THE POND/STACK HAVE A LINER SYSTEM?	NO
TOTAL AREA OF DISTURBANCE (FACILITY AREA)	3.0	TYPE OF POND/STACK LINER SYSTEM	N/A
OVERALL POND/STACK SIZE	16.0	ASSUMED THICKNESS OF EMPLACED ASH AT CLOSURE (FT)	TBD

					Alternative A.1.b			
		TASK	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	NOTES
MOBILIZATION/ SITE PREP	MOBILIZATION / SITE PREP							
	1	MOBILIZATION	LS	2.5% of Total Estimate	1	\$15,000		Mob/Demob & insurance: Includes administration (meetings, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup). 2.5% of Construction Sub-Total.
	2	REMOVE ORGANICS	ACRE	\$1,500	3	\$4,500		Remove organic materials and mulch left over from clearing operations. Cost based on TVA Ash Pond Closure Template.
EARTHWORK	EARTHWORK							
	3	FINISH GRADING	ACRE	\$4,500	3	\$13,500		Finish grading of soil fill. Unit cost based on 2013 RSMeans Section 31 22 16.10 Item 0100.
	4	SOD	ACRE	\$15,000	1	\$15,000		Unit cost based on actual cost of sod installation for the DuPond Dredge Cell Closure project.
SITE WORK / SITE RESTORATION	5	PLACE SOIL FILL IN THE EXISTING EAST CHANNEL	CYD	\$18	2,500	\$45,000		General fill from off-site borrow source. Includes excavation, hauling, and placement. Unit cost based on TVA Ash Pond Closure Template and RSMeans Section 31 23 23.20 Item 1238 for 10 mile round-trip hauling distance.
	ROADS							
	6	CONSTRUCTION ENTRANCES	EACH	\$15,000	2	\$30,000		Entrance for heavy construction equipment and vehicles to enter the site and cross the fuel oil line. Unit costs estimated by Stantec.
	SURFACE DRAINAGE							
	7	GROUTED RIPRAP	CYD	\$115	3,500	\$402,500		1.5-foot layer of riprap with the void space filled with grout. Riprap void space assumed to be 30%. Cost of rip rap based on TVA Ash Pond Closure Template at \$45/cyd. Cost of grout estimated at \$225/cyd from 2012 KYTC Average Unit Bid Prices, Item - 23911EC.
	8	40-MIL LLDPE GEOMEMBRANE	SQ. FT.	\$0.45	60,000	\$27,000		Unit cost based on TVA Ash Pond Closure Template.
	9	GEOTEXTILE	SQ. FT.	\$0.20	60,000	\$12,000		Geotextile cushion between residuals and cap. Unit cost based on TVA Ash Pond Closure Template.
OTHER SITE SPECIFIC ITEMS	SITE RESTORATION							
	10	EROSION PREVENTION AND SEDIMENT CONTROL	LS	\$25,000	1	\$25,000		Installation of erosion control features (silt fences, rock check walls, etc.).
	OTHER SITE SPECIFIC ITEMS							
TOTAL						\$	589,500	

CALCULATION SHEET DRAFT	PROJECT	TVA CONFIDENTIAL INFORMATION North Drainage Culvert	IDENTIFICATION INFORMATION Johnsonville Fossil Plant	SHEET		REV. NO.
	SUBJECT			2 of 2		A
	ACTIVITY			DATE LAST MODIFIED:		REVIEWED BY:
		Conceptual Construction Cost Estimate	IMPOUNDMENT NAME:	CLIENT PROJECT #		CONSULTANT JOB NO.
		Detailed Cost Estimate	Ash Area No. 1	601939		175551013
			ESTIMATE ID#:	LAST UPDATED BY:	DATE LAST MODIFIED:	
			Alternative A.2	JES	02/11/14	

BASIS OF THE ESTIMATE		POND/STACK DETAILS	
YEAR	2014	DOES THE POND/STACK HAVE A LINER SYSTEM?	NO
TOTAL AREA OF DISTURBANCE (FACILITY AREA)	3.0	TYPE OF POND/STACK LINER SYSTEM	N/A
OVERALL POND/STACK SIZE	16.0	ASSUMED THICKNESS OF EMPLACED ASH AT CLOSURE (FT)	TBD

					Alternative A.2			
	TASK	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	NOTES	
MOBILIZATION/ SITE PREP	MOBILIZATION / SITE PREP							
	1	MOBILIZATION	LS	2.5% of Total Estimate	1	\$13,000	Mob/Demob & insurance: Includes administration (meetings, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup). 2.5% of Construction Sub-Total.	
	2	REMOVE ORGANICS	ACRE	\$1,500	3	\$4,500	Remove mulch left over from clearing operations. Unit cost based on TVA Ash Pond Closure Template.	
EARTHWORK	EARTHWORK							
	3	FINISH GRADING	ACRE	\$4,500	3	\$13,500	Finish grading of soil fill. Unit cost based on 2013 RSMeans Section 31 22 16.10 Item 0100.	
	4	SOD	ACRE	\$15,000	3	\$45,000	Unit cost based on actual cost of sod installation for the DuPond Dredge Cell Closure project.	
	5	PLACE SOIL FILL IN THE EXISTING EAST CHANNEL	CYD	\$18	2,500	\$45,000	General fill from off-site borrow source. Includes excavation, hauling, and placement. Unit cost based on TVA Ash Pond Closure Template and RSMeans Section 31 23 23.20 Item 1238 for 10 mile round-trip hauling distance.	
SITE WORK / SITE RESTORATION	ROADS							
	6	CONSTRUCTION ENTRANCES	EACH	\$15,000	2	\$30,000	Entrance for heavy construction equipment and vehicles to enter the site and cross the fuel oil line. Unit costs estimated by Stantec.	
	SURFACE DRAINAGE							
	7	INSTALL 42" HDPE DR 17 PIPE	LF	\$200	1,020	\$204,000	Smooth walled and butt fused HDPE pipe. Cost is for pipe material, jointing using butt fusion process, and placement in trench. Material cost based on quote from supplier. Installation based on 2013 RSMeans Section 33 41 13.50 Item 1100 taken as the total cost including O&P, minus material cost.	
	8	MANHOLE (5' DIAMETER)	EA	\$2,950	1	\$2,950	2103 RSMeans 33 49 13.1160 for 5' ID manhole, 6' deep.	
	9	STORMWATER INLETS	EACH	\$1,500	4	\$6,000	Unit cost estimated from 2012 KYTC Average Unit Bid Prices Item 01541.	
	10	INSTALL 42" HEADWALL	EACH	\$8,750	1	\$8,750	2013 RSMeans Section G3030 310 4540.	
	11	PLACE SOIL FILL ABOVE HDPE CULVERT	CYD	\$18	2,500	\$45,000	General fill from off-site borrow source. Includes excavation, hauling, and placement. Unit cost based on TVA Ash Pond Closure Template and RSMeans Section 31 23 23.20 Item 1238 for 10 mile round-trip hauling distance.	
	12	HDPE PIPE BACKFILL WITH CRUSHED STONE	CYD	\$52	1,500	\$78,000	Import and place crushed stone. Unit cost based on 2013 RSMeans 31 23 23.16 0050 and 0500 for compacted crushed stone.	
	SITE RESTORATION							
	13	EROSION PREVENTION AND SEDIMENT CONTROL	LS	\$25,000	1	\$25,000	Installation of erosion control features (silt fences, rock check walls, etc.).	
OTHER SITE SPECIFIC ITEMS	OTHER SITE SPECIFIC ITEMS							
				TOTAL		\$ 520,700		

CALCULATION SHEET DRAFT	PROJECT	IDENTIFICATION INFORMATION Johnsonville Fossil Plant		SHEET	REV. NO.
	North Drainage Culvert			2 of 2	A
	SUBJECT	IMPOUNDMENT NAME:	CLIENT PROJECT #	CONSULTANT JOB NO.	
	Conceptual Construction Cost Estimate	Ash Area No. 1	601939	175551013	
	ACTIVITY	ESTIMATE ID#:	LAST UPDATED BY:	DATE LAST MODIFIED:	REVIEWED BY:
	Detailed Cost Estimate	Alternative B.1	JES	02/11/14	

BASIS OF THE ESTIMATE			POND/STACK DETAILS			
YEAR		2014	DOES THE POND/STACK HAVE A LINER SYSTEM?			
TOTAL AREA OF DISTURBANCE (FACILITY AREA)		3.0	Acres			
OVERALL POND/STACK SIZE		16.0	Acres			
			ASSUMED THICKNESS OF EMPLACED ASH AT CLOSURE (FT)			

					Alternative B.1			
	TASK	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	NOTES	
MOBILIZATION/ SITE PREP	MOBILIZATION / SITE PREP							
	1	MOBILIZATION	LS	2.5% of Total Estimate	1	\$2,000	Mob/Demob & insurance: Includes administration (meetings, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup). 2.5% of Construction Sub-Total.	
EARTHWORK	EARTHWORK							
	2	OPEN CUT THROUGH DIKE AND REMOVE EXISTING PIPE	CY	\$6	800	\$4,800	Open cut through western dike and removal the existing 36" CPP culvert. Cut material to be reused as fill within the ash disposal area. Unit cost from 2013 RSMeans Section 31 23 16.46 Item 5570.	
SITE WORK / SITE RESTORATION	SURFACE DRAINAGE							
	3	GROUTED RIPRAP	CYD	\$115	350	\$40,250	1.5-foot layer of riprap with the void space filled with grout. Riprap void space assumed to be 30%. Cost of rip rap based on TVA Ash Pond Closure Template at \$45/cyd. Cost of grout estimated at \$225/cyd from 2012 KYTC Average Unit Bid Prices, Item - 23911EC.	
	4	CONCRETE STAIRS/SAMPLING WALKWAY	LS	\$4,500	1	\$4,500	2013 RSMeans 03 30 53.40 6850 and 03 30 53.40 7050 for stairs and landings cast on ground. Assumes the walkway at bottoms of stiars is a landing. 50% factore included for landings due to varying thicknesses.	
	5	HANDRAIL	LF	\$60	125	\$7,500	2013 RSMeans 05 52 13.50 0560 for "galvanized steel, 2 rails, 1-1/2" diameter."	
OTHER SITE SPECIFIC ITEMS	OTHER SITE SPECIFIC ITEMS							
				TOTAL		\$ 59,050		

CALCULATION SHEET DRAFT	PROJECT	TVA CONFIDENTIAL INFORMATION		IDENTIFICATION INFORMATION		SHEET	REV. NO.		
	Johnsonville Fossil Plant			2 of 2		A			
	SUBJECT	Conceptual Construction Cost Estimate		IMPOUNDMENT NAME:		CLIENT PROJECT #		CONSULTANT JOB NO.	
			Ash Area No. 1		601939		175551013		
	ACTIVITY	ESTIMATE ID#:		LAST UPDATED BY:		DATE LAST MODIFIED:		REVIEWED BY:	
	Detailed Cost Estimate		Alternative B.2		JES		02/11/14		

BASIS OF THE ESTIMATE			POND/STACK DETAILS			
YEAR		2014	DOES THE POND/STACK HAVE A LINER SYSTEM?			
TOTAL AREA OF DISTURBANCE (FACILITY AREA)		3.0	TYPE OF POND/STACK LINER SYSTEM			
OVERALL POND/STACK SIZE		16.0	ASSUMED THICKNESS OF EMPLACED ASH AT CLOSURE (FT)			

					Alternative B.2		
	TASK	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	NOTES
MOBILIZATION/ SITE PREP	MOBILIZATION / SITE PREP						
	1	MOBILIZATION	LS	2.5% of Total Estimate	1	\$2,000	Mob/Demob & insurance: Includes administration (meetings, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup). 2.5% of Construction Sub-Total.
EARTHWORK	EARTHWORK						
	2	OPEN CUT THROUGH DIKE AND REMOVE EXISTING PIPE	CY	\$6	500	\$3,000	Open cut through western dike and removal the existing 36" CPP culvert. Cut material to be reused as fill within the ash disposal area. Unit cost from 2013 RSMeans Section 31 23 16.46 Item 5570.
SITE WORK / SITE RESTORATION	SURFACE DRAINAGE						
	3	INSTALL 42" HDPE DR 17 PIPE	LF	\$200	100	\$20,000	Smooth walled and butt fused HDPE pipe. Cost is for pipe material, jointing using butt fusion process, and placement in trench. Material cost based on quote from supplier. Installation based on 2013 RSMeans Section 33 41 13.50 Item 1100 taken as the total cost including O&P, minus material cost.
	4	INSTALL 42" HEADWALL	EACH	\$5,200	1	\$5,200	2013 RSMeans Section G3030 310 4540.
	5	HDPE PIPE BACKFILL WITH CRUSHED STONE	CYD	\$52	120	\$6,240	Import and place crushed stone. Unit cost based on 2013 RSMeans 31 23 23.16 0050 and 0500 for compacted crushed stone.
	6	PLACE SOIL FILL ABOVE HDPE CULVERT	CYD	\$18	200	\$3,600	General fill from off-site borrow source. Includes excavation, hauling, and placement. Unit cost based on TVA Ash Pond Closure Template and RSMeans Section 31 23 23.20 Item 1238 for 10 mile round-trip hauling distance.
	7	GROUTED RIPRAP	CYD	\$115	250	\$28,750	1.5-foot layer of riprap with the void space filled with grout. Riprap void space assumed to be 30%. Cost of rip rap based on TVA Ash Pond Closure Template at \$45/cyd. Cost of grout estimated at \$225/cyd from 2012 KYTC Average Unit Bid Prices, Item - 23911EC.
	8	CONCRETE STAIRS/SAMPLING WALKWAY	LS	\$4,500	1	\$4,500	2013 RSMeans 03 30 53.40 6850 and 03 30 53.40 7050 for stairs and landings cast on ground. Assumes the walkway at bottoms of stiars is a landing. 50% factor included for landings due to varying thicknesses.
	9	HANDRAIL	LF	\$60	125	\$7,500	Handrails for stair/sampling walkway. Unit price based on 2013 RSMeans 05 52 13.50 0560.
OTHER SITE SPECIFIC ITEMS	OTHER SITE SPECIFIC ITEMS						
				TOTAL		\$ 80,790	

<div>CALCULATION SHEET</div> <div>DRAFT</div>	PROJECT		IDENTIFICATION INFORMATION		SHEET		REV. NO.	
	North Drainage Culvert		Johnsonville Fossil Plant		2 of 2		A	
	SUBJECT		IMPOUNDMENT NAME:		CLIENT PROJECT #		CONSULTANT JOB NO.	
	Conceptual Construction Cost Estimate		Ash Area No. 1		601939		175551013	
	ACTIVITY		ESTIMATE ID#:	LAST UPDATED BY:	DATE LAST MODIFIED:		REVIEWED BY:	
	Detailed Cost Estimate		Alternative B.3.a	JES	02/11/14			

BASIS OF THE ESTIMATE		POND/STACK DETAILS	
YEAR	2014	DOES THE POND/STACK HAVE A LINER SYSTEM?	NO
TOTAL AREA OF DISTURBANCE (FACILITY AREA)	3.0	TYPE OF POND/STACK LINER SYSTEM	N/A
OVERALL POND/STACK SIZE	16.0	ASSUMED THICKNESS OF EMPLACED ASH AT CLOSURE (FT)	TBD

					Alternative B.3.a			
		TASK	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	NOTES
MOBILIZATION/ SITE PREP	MOBILIZATION / SITE PREP							
	1		MOBILIZATION	LS	2.5% of Total Estimate	1	\$7,000	Mob/Demob & insurance: Includes administration (meetings, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup). 2.5% of Construction Sub-Total.
SITE WORK / SITE RESTORATION	SURFACE DRAINAGE							
	2		JACK AND BORE - 54" CASING	LF	\$1,500	120	\$180,000	Average unit cost for projects previously completed by Stantec.
	3		INSTALL 42" HDPE DR 17 PIPE THROUGH 54" STEEL CASING	LF	\$210	120	\$25,200	Cost includes HDPE pipe and grout installation. Void space to be filled with grout is 30cy and cost of grout is \$225/cy from 2012 KYTC Average Unit Bid Prices, Item - 23911EC. Use \$30/cy for grout through void. Pipe material cost from supplier quote at \$150/lf.
	4		ABANDON EXISTING CULVERT THROGH DIKE	LS	\$8,000	1	\$8,000	Cap existing culvert and fill with grout. Cost of grout estimated at \$225/cyd from 2012 KYTC Average Unit Bid Prices, Item - 23911EC.
	5		INSTALL 42" HEADWALL	EACH	\$5,200	1	\$5,200	2013 RSMeans Section G3030 310 4540.
	8		GROUTED RIPRAP	CYD	\$115	100	\$11,500	1.5-foot layer of riprap with the void space filled with grout. Riprap void space assumed to be 30%. Cost of rip rap based on TVA Ash Pond Closure Template at \$45/cyd. Cost of grout estimated at \$225/cyd from 2012 KYTC Average Unit Bid Prices, Item - 23911EC.
	9		CONCRETE STAIRS/SAMPLING WALKWAY	LS	\$4,500	1	\$4,500	2013 RSMeans 03 30 53.40 6850 and 03 30 53.40 7050 for stairs and landings cast on ground. Assumes the walkway at bottoms of stairs is a landing. 50% factor included for landings due to varying thicknesses.
	10		HANDRAIL	LF	\$60	125	\$7,500	2013 RSMeans 05 52 13.50 0560 for "galvanized steel, 2 rails, 1-1/2" diameter."
OTHER SITE SPECIFIC ITEMS	OTHER SITE SPECIFIC ITEMS							
					TOTAL		\$ 248,900	

CALCULATION SHEET DRAFT	PROJECT	IDENTIFICATION INFORMATION		SHEET	REV. NO.
	North Drainage Culvert	Johnsonville Fossil Plant		2 of 2	A
	SUBJECT	IMPOUNDMENT NAME:		CLIENT PROJECT #	CONSULTANT JOB NO.
	Conceptual Construction Cost Estimate	Ash Area No. 1		601939	175551013
	ACTIVITY	ESTIMATE ID#:	LAST UPDATED BY:	DATE LAST MODIFIED:	REVIEWED BY:
	Detailed Cost Estimate	Alternative B.3.b	JES	02/11/14	

BASIS OF THE ESTIMATE			POND/STACK DETAILS		
YEAR		2014	DOES THE POND/STACK HAVE A LINER SYSTEM?		
TOTAL AREA OF DISTURBANCE (FACILITY AREA)		3.0	TYPE OF POND/STACK LINER SYSTEM		
OVERALL POND/STACK SIZE		16.0	ASSUMED THICKNESS OF EMPLACED ASH AT CLOSURE (FT)		

					Alternative B.3.b			
	TASK	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	NOTES	
MOBILIZATION/ SITE PREP	MOBILIZATION / SITE PREP							
	1	MOBILIZATION	LS	2.5% of Total Estimate	1	\$13,000	Mob/Demob & insurance: Includes administration (meetings, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup). 2.5% of Construction Sub-Total.	
SITE WORK / SITE RESTORATION	SURFACE DRAINAGE							
	2	MICROTUNNELING	LF	\$3,500	120	\$420,000	Average unit cost for projects previously completed by Stantec.	
	3	INSTALL 42" HDPE DR 17 PIPE THROUGH 54" STEEL CASING	LF	\$210	120	\$25,200	Cost includes HDPE pipe and grout installation. Void space to be filled with grout is 30cy and cost of grout is \$225/cy from 2012 KYTC Average Unit Bid Prices, Item - 23911EC. Use \$30/cy for grout through void. Pipe material cost from supplier quote at \$150/lf.	
	4	ABANDON EXISTING CULVERT THROGH DIKE	LS	\$8,000	1	\$8,000	Cap existing culvert and fill with grout. Cost of grout estimated at \$225/cyd from 2012 KYTC Average Unit Bid Prices, Item - 23911EC.	
	5	INSTALL 42" HEADWALL	EACH	\$5,200	1	\$5,200	2013 RSMeans Section G3030 310 4540.	
	6	GROUTED RIPRAP	CYD	\$115	100	\$11,500	1.5-foot layer of riprap with the void space filled with grout. Riprap void space assumed to be 30%. Cost of rip rap based on TVA Ash Pond Closure Template at \$45/cyd. Cost of grout estimated at \$225/cyd from 2012 KYTC Average Unit Bid Prices, Item - 23911EC.	
	7	CONCRETE STAIRS/SAMPLING WALKWAY	LS	\$4,500	1	\$4,500	2013 RSMeans 03 30 53.40 6850 and 03 30 53.40 7050 for stairs and landings cast on ground. Assumes the walkway at bottoms of stairs is a landing. 50% factor included for landings due to varying thicknesses.	
	8	HANDRAIL	LF	\$60	125	\$7,500	2013 RSMeans 05 52 13.50 0560 for "galvanized steel, 2 rails, 1-1/2" diameter."	
OTHER SITE SPECIFIC ITEMS	OTHER SITE SPECIFIC ITEMS							
				TOTAL		\$ 494,900		

CALCULATION SHEET DRAFT	PROJECT Rock Buttreassing	TVA CONFIDENTIAL INFORMATION		IDENTIFICATION INFORMATION Johnsonville Fossil Plant	SHEET 1 of 1	REV. NO. A
	SUBJECT Conceptual Construction Cost Estimate	IMPOUNDMENT NAME: Ash Area No. 1		CLIENT PROJECT # 605972	CONSULTANT JOB NO. 175551013	
	ACTIVITY Detailed Cost Estimate	ESTIMATE ID#: Alternative 1	LAST UPDATED BY: JES	DATE LAST MODIFIED: 02/11/14	REVIEWED BY:	

BASIS OF THE ESTIMATE			POND/STACK DETAILS		
YEAR		2014	DOES THE POND/STACK HAVE A LINER SYSTEM?		NO
TOTAL AREA OF DISTURBANCE (FACILITY AREA)		4.0	TYPE OF POND/STACK LINER SYSTEM		N/A
OVERALL POND/STACK SIZE		16.0	ASSUMED THICKNESS OF EMPLACED ASH AT CLOSURE (FT)		TBD

					Alternative 1		
	TASK	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	NOTES
MOBILIZATION/ SITE PREP	MOBILIZATION / SITE PREP						
	1	MOBILIZATION	LS	2.5% of Total Estimate	1	\$19,000	Mob/Demob & insurance: Includes administration (meetings, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup). 2.5% of Construction Sub-Total.
SITE WORK / SITE RESTORATION	ROADS						
	2	CONSTRUCTION ENTRANCES	EACH	\$15,000	1	\$15,000	Entrance for heavy construction equipment and vehicles to enter the site and cross the fuel oil line. Unit costs estimated by Stantec.
	EARTHWORK						
	3	GRADED FILTER	CYD	\$45.00	4,000	\$180,000	Import and place graded filter material. Unit cost based on TDOT 2013 Average Unit Bid Prices Item number 303-10.01
	4	40-MIL LLDPE GEOMEMBRANE	SQ. FT.	\$0.45	120,000	\$54,000	Unit cost based on TVA Ash Pond Closure Template.
	5	GEOTEXTILE	SQ. FT.	\$0.20	120,000	\$24,000	Geotextile cushion between geomembrane and riprap or soil cover. Unit cost based on TVA Ash Pond Closure Template.
	6	RIPRAP	CYD	\$45	9,000	\$405,000	Riprap for erosion protection and cover over geomembrane and geotextile. Based from TVA Ash Pond Closure Template.
	7	FENCE REMOVAL	LF	\$5	950	\$4,750	Unit costs based on 2013 RSMeans Section 02 41 13.60 Item 1700.
	8	INSTALL FENCE	LF	\$52	950	\$49,400	Unit costs based on 2013 RSMeans Section 32 31 13.20 Item 0940.
	9	INSTALL GATE	EACH	\$2,000	1	\$2,000	Unit costs based on 2013 RSMeans Section 32 31 13.20 Item 5080.
	SITE RESTORATION						
	10	EROSION PREVENTION AND SEDIMENT CONTROL	LS	\$5,000	1	\$5,000	Installation of erosion control features (silt fences, rock check walls, etc.).
OTHER SITE SPECIFIC ITEMS	OTHER SITE SPECIFIC ITEMS						
				TOTAL		\$ 739,150	

CALCULATION SHEET DRAFT	PROJECT	TVA CONFIDENTIAL INFORMATION		IDENTIFICATION INFORMATION		SHEET	REV. NO.
	Rock Buttrressing			Johnsonville Fossil Plant		1 of 1	A
	SUBJECT	Conceptual Construction Cost Estimate		IMPOUNDMENT NAME:		CLIENT PROJECT #	CONSULTANT JOB NO.
		Ash Area No. 1		605972		175551013	
	ACTIVITY	ESTIMATE ID#:		LAST UPDATED BY:	DATE LAST MODIFIED:	REVIEWED BY:	
	Detailed Cost Estimate	Alternative 2		JES	02/11/14		

BASIS OF THE ESTIMATE		POND/STACK DETAILS	
YEAR	2014	DOES THE POND/STACK HAVE A LINER SYSTEM?	NO
TOTAL AREA OF DISTURBANCE (FACILITY AREA)	4.0	TYPE OF POND/STACK LINER SYSTEM	N/A
OVERALL POND/STACK SIZE	16.0	ASSUMED THICKNESS OF EMPLACED ASH AT CLOSURE (FT)	TBD

					Alternative 2			
		TASK	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	NOTES
MOBILIZATION/ SITE PREP	MOBILIZATION / SITE PREP							
	1	MOBILIZATION	LS	2.5% of Total Estimate	1	\$15,000		Mob/Demob & insurance: Includes administration (meetings, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup). 2.5% of Construction Sub-Total.
SITE WORK / SITE RESTORATION	ROADS							
	2	CONSTRUCTION ENTRANCES	EACH	\$15,000	1	\$15,000		Entrance for heavy construction equipment and vehicles to enter the site and cross the fuel oil line. Unit costs estimated by Stantec.
	EARTHWORK							
	3	GRADED FILTER	CYD	\$45	4,000	\$180,000		Import and place graded filter material. Unit cost based on TDOT 2013 Average Unit Bid Prices Item number 303-10.01
	4	40-MIL LLDPE GEOMEMBRANE	SQ. FT.	\$0.45	120,000	\$54,000		Unit cost based on TVA Ash Pond Closure Template.
	5	GEOTEXTILE	SQ. FT.	\$0.20	120,000	\$24,000		Geotextile cushion between geomembrane and riprap or soil cover. Unit cost based on TVA Ash Pond Closure Template.
	6	RIPRAP	CYD	\$45	2,250	\$101,250		Riprap for erosion protection and cover over geomembrande and geotextile. Based from TVA Ash Pond Closure Template.
	7	PLACE SOIL FILL	CYD	\$18	6,750	\$121,500		General fill from off-site borrow source. Includes excavation, hauling, and placement. Unit cost based on TVA Ash Pond Closure Template and RSMeans Section 31 23 23.20 Item 1238 for 10 mile round-trip hauling distance.
	8	SOD	ACRE	\$15,000	2	\$30,000		Unit cost based on actual cost of sod installation for the DuPond Dredge Cell Closure project.
	9	FENCE REMOVAL	LF	\$5	950	\$4,750		Unit costs based on 2013 RSMeans Section 02 41 13.60 Item 1700.
	10	INSTALL FENCE	LF	\$52	950	\$49,400		Unit costs based on 2013 RSMeans Section 32 31 13.20 Item 0940.
	11	INSTALL GATE	EACH	\$2,000	1	\$2,000		Unit costs based on 2013 RSMeans Section 32 31 13.20 Item 5080.
	SITE RESTORATION							
	12	EROSION PREVENTION AND SEDIMENT CONTROL	LS	\$5,000	1	\$5,000		Installation of erosion control features (silt fences, rock check walls, etc.).
OTHER SITE SPECIFIC ITEMS	OTHER SITE SPECIFIC ITEMS							
				TOTAL		\$	586,900	

<div>CALCULATION SHEET</div> <div>DRAFT</div>	PROJECT		IDENTIFICATION INFORMATION		SHEET		REV. NO.	
	Cap Installation		Johnsonville Fossil Plant		1 of 1		A	
	SUBJECT		IMPOUNDMENT NAME:		CLIENT PROJECT #		CONSULTANT JOB NO.	
	Conceptual Construction Cost Estimate		Ash Area No. 1		605790		175551013	
	ACTIVITY		ESTIMATE ID#:	LAST UPDATED BY:	DATE LAST MODIFIED:		REVIEWED BY:	
	Detailed Cost Estimate		Alternative 1	JES	02/11/14			

BASIS OF THE ESTIMATE		POND/STACK DETAILS	
YEAR	2014	DOES THE POND/STACK HAVE A LINER SYSTEM?	NO
TOTAL AREA OF DISTURBANCE (FACILITY AREA)	14.0	TYPE OF POND/STACK LINER SYSTEM	N/A
OVERALL POND/STACK SIZE	16.0	ASSUMED THICKNESS OF EMPLACED ASH AT CLOSURE (FT)	27' - 41'

					Alternative 1			
		TASK	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	NOTES
MOBILIZATION/ SITE PREP	MOBILIZATION / SITE PREP							
	1	MOBILIZATION	LS	2.5% of Total Estimate	1	\$73,000		Mob/Demob & insurance: Includes administration (meetings, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup). 2.5% of Construction Sub-Total.
	2	REMOVE ORGANICS	ACRE	\$1,500.00	16	\$24,000		Remove organic materials and mulch left over from clearing operations. Cost based on TVA Ash Pond Closure Template.
SITE WORK / SITE RESTORATION	ROADS							
	3	CONSTRUCTION ENTRANCES	EACH	\$15,000	2	\$30,000		Entrance for heavy construction equipment and vehicles to enter the site and cross the fuel oil line. Unit costs estimated by Stantec.
	EARTHWORK							
	4	FINISH GRADING	ACRE	\$4,500.00	16	\$72,000		Finish grading of soil fill. Unit cost based on 2013 RSMeans Section 31 22 16.10 Item 0100.
	5	GEOTEXTILE	SQ. FT.	\$0.20	700,000	\$140,000		Geotextile cushion between residuals and cap. Unit cost based on TVA Ash Pond Closure Template.
	6	40-MIL LLDPE GEOMEMBRANE	SQ. FT.	\$0.61	700,000	\$427,000		Cap over residuals. Unit cost based on JSF DFAS bids.
	7	GEOCOMPOSITE DRAINAGE LAYER	SQ. FT.	\$0.74	700,000	\$518,000		Unit cost based on JSF DFAS bids.
	8	PLACE SOIL FILL	CYD	\$18.00	80,000	\$1,440,000		General fill from off-site borrow source. Includes excavation, hauling, and placement. Unit cost based on TVA Ash Pond Closure Template and RSMeans Section 31 23 23.20 Item 1238 for 10 mile round-trip hauling distance.
	9	SOD	ACRE	\$15,000.00	16	\$240,000		Unit cost based on actual cost of sod installation for the DuPond Dredge Cell Closure project.
	SITE RESTORATION							
	10	EROSION PREVENTION AND SEDIMENT CONTROL	LS	\$25,000	1	\$25,000		Installation of erosion control features (silt fences, rock check walls, etc.).
OTHER SITE SPECIFIC ITEMS	OTHER SITE SPECIFIC ITEMS							
				TOTAL		\$	2,916,000	

<div>CALCULATION SHEET</div> <div>DRAFT</div>	PROJECT	IDENTIFICATION INFORMATION		SHEET	REV. NO.
	Cap Installation	Johnsonville Fossil Plant		1 of 1	A
	SUBJECT	IMPOUNDMENT NAME:		CLIENT PROJECT #	CONSULTANT JOB NO.
	Conceptual Construction Cost Estimate	Ash Area No. 1		605790	175551013
	ACTIVITY	ESTIMATE ID#:	LAST UPDATED BY:	DATE LAST MODIFIED:	REVIEWED BY:
	Detailed Cost Estimate	Alternative 2	JES	02/11/14	

BASIS OF THE ESTIMATE		POND/STACK DETAILS	
YEAR	2014	DOES THE POND/STACK HAVE A LINER SYSTEM?	NO
TOTAL AREA OF DISTURBANCE (FACILITY AREA)	14.0	TYPE OF POND/STACK LINER SYSTEM	N/A
OVERALL POND/STACK SIZE	16.0	ASSUMED THICKNESS OF EMPLACED ASH AT CLOSURE (FT)	27' - 41'

					Alternative 2			
		TASK	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	NOTES
MOBILIZATION/ SITE PREP	MOBILIZATION / SITE PREP							
	1		MOBILIZATION	LS	2.5% of Total Estimate	1	\$83,000	Mob/Demob & insurance: Includes administration (meetings, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup). 2.5% of Construction Sub-Total.
	2		REMOVE ORGANICS	ACRE	\$1,500.00	16	\$24,000	Remove organic materials and mulch left over from clearing operations. Cost based on TVA Ash Pond Closure Template.
SITE WORK / SITE RESTORATION	ROADS							
	3		CONSTRUCTION ENTRANCES	EACH	\$15,000	2	\$30,000	Entrance for heavy construction equipment and vehicles to enter the site and cross the fuel oil line. Unit costs estimated by Stantec.
	EARTHWORK							
	4		FINISH GRADING	ACRE	\$4,500.00	16	\$72,000	Finish grading of soil fill. Unit cost based on 2013 RSMeans Section 31 22 16.10 Item 0100.
	5		IMPORT, PLACE, AND COMPACT LOW PERMEABLE SOIL	CYD	\$35.00	55,000	\$1,925,000	Cap over residuals. Cost to haul and place low-permeable soil. Unit cost based on JOF Island Closure Estimate.
	6		PLACE SOIL FILL	CYD	\$18.00	55,000	\$990,000	General fill from off-site borrow source. Includes excavation, hauling, and placement. Unit cost based on TVA Ash Pond Closure Template and RSMeans Section 31 23 23.20 Item 1238 for 10 mile round-trip hauling distance.
	7		SOD	ACRE	\$15,000.00	16	\$240,000	Unit cost based on actual cost of sod installation for the DuPond Dredge Cell Closure project.
	SITE RESTORATION							
	8		EROSION PREVENTION AND SEDIMENT CONTROL	LS	\$25,000	1	\$25,000	Installation of erosion control features (silt fences, rock check walls, etc.).
OTHER SITE SPECIFIC ITEMS	OTHER SITE SPECIFIC ITEMS							
					TOTAL		\$ 3,306,000	

Attachment E

Stantec Fee Estimate
Derivation

Client Tennessee Valley Authority
 Project Name North Drainage Culvert
 Location New Johnsonville, Humphreys County, Tennessee
 Facility Johnsonville Fossil Plant
 Date February 14, 2014
 Project No. TVA No. 601939

Prepared By MAT
 Reviewed By



Fee Estimate - Phase 2 (Engineering Design and Permitting Support)

Labor Fee Estimate Derivation & Task Totals

		Principal Engineer	Associate Engineer	Sr. Engineer/ Project Manager	Senior Project Engineer	Project Engineer	Senior Enviro. Scientist	Design CADD/GIS	Steno-graphic Services	Expenses	
Task No.	Item Description	\$ 225.00	\$ 205.00	\$ 160.00	\$ 120.00	\$ 100.00	\$ 130.00	\$ 100.00	\$ 60.00	Derivation Follows	
1	Project Set-Up, Project Plan & Kick-Off Meeting										
1.1	Project Administration Activities	4		4	10	4		2			\$ 3,340
1.2	Project Kick-Off Meeting	16		16	16				2	\$ 1,103	\$ 9,303
	Task Subtotal (Hours) = 74	20	0	20	26	4	0	2	2		
	Task Subtotal (Fees)	\$ 4,500	\$ -	\$ 3,200	\$ 3,120	\$ 400	\$ -	\$ 200	\$ 120	\$ 1,103	\$ 12,643
2	Analysis & Design										
2.1	Engineering	4		4	24	40		2			\$ 8,620
2.2	Calculation Package	2		2	16	24		2	2		\$ 5,410
	Task Subtotal (Hours) = 122	6	0	6	40	64	0	4	2		
	Task Subtotal (Fees)	\$ 1,350	\$ -	\$ 960	\$ 4,800	\$ 6,400	\$ -	\$ 400	\$ 120	\$ -	\$ 14,030
3	Preparation of Plans and Specifications										
3.1	Prepare 60% Plans & Details	2	2	2	2	30		40			\$ 8,420
3.2	Prepare Specifications	2	2	2	2	30			4		\$ 4,660
3.3	Independent Technical Review	8									\$ 1,800
3.4	Prepare and Submit Draft 95% Issue for Review (IFR) Package	2	2	2		8		8	4	\$ 50	\$ 3,070
3.5	Draft 95% IFR Review Meeting with TVA	16		16	16				2	\$ 1,103	\$ 9,303
3.6	Prepare and Submit Draft SWPPP Package	4		8	24	32	24	16	8	\$ 50	\$ 13,510
3.7	Prepare Updated Construction Cost Opinion	2	2	4	4	16			2		
3.8	Address Comments, Prepare, and Submit Final 100% Issue for Construction (IFC) Package	2		4		8		8	4	\$ 50	\$ 2,980
3.9	Prepare and Submit Final SWPPP Package	2		4		8		4	2	\$ 50	\$ 2,460
3.10	Final 100% IFC Review Meeting with TVA	4		8	16				2	\$ 871	\$ 5,091
	Task Subtotal (Hours) = 426	44	8	50	64	132	24	76	28		
	Task Subtotal (Fees)	\$ 9,900	\$ 1,640	\$ 8,000	\$ 7,680	\$ 13,200	\$ 3,120	\$ 7,600	\$ 1,680	\$ 2,174	\$ 54,994
4	Permitting Support										
4.1	Coordination and Support TVA Environmental Dept.	2		8			16	8			\$ 4,610
	Task Subtotal (Hours) = 34	2	0	8	0	0	16	8	0		
	Task Subtotal (Fees)	\$ 450	\$ -	\$ 1,280	\$ -	\$ -	\$ 2,080	\$ 800	\$ -	\$ -	\$ 4,610

TVA CONFIDENTIAL INFORMATION

Stantec Consulting Services Inc.

		Principal Engineer	Associate Engineer	Sr. Engineer/ Project Manager	Senior Project Engineer	Project Engineer	Senior Enviro. Scientist	Design CADD/GIS	Steno-graphic Services	Expenses	
Task No.	Item Description	\$ 225.00	\$ 205.00	\$ 160.00	\$ 120.00	\$ 100.00	\$ 130.00	\$ 100.00	\$ 60.00	Derivation Follows	
5	Construction QA and Contingency Plans										
5.1	Develop Construction QA Plan			2	4	12			2		\$ 2,120
5.2	Develop Contingency Plan			2	4	12			2		\$ 2,120
5.3	Independent Technical Review	4									\$ 900
5.4	Prepare and Submit Draft Construction QA Plan			2		8			2	\$ 50	\$ 1,290
5.5	Prepare and Submit Draft Contingency Plan			2		8			2	\$ 50	\$ 1,290
5.6	Construction Review Meeting with TVA	16		16	16	16			2	\$ 1,103	\$ 10,903
5.7	Prepare and Submit Final Construction QA Plan	1		2		4			1	\$ 50	\$ 1,055
5.8	Prepare and Submit Final Contingency Plan	1		2		4			1	\$ 50	\$ 1,055
	Task Subtotal (Hours) = 150	22	0	28	24	64	0	0	12		
	Task Subtotal (Fees)	\$ 4,950	\$ -	\$ 4,480	\$ 2,880	\$ 6,400	\$ -	\$ -	\$ 720	\$ 1,303	\$ 20,733
6	Basis of Design Report										
6.1	Prepare and Submit Draft Basis of Design Report	4		6	10	16		2	4	\$ 50	\$ 5,150
6.2	Prepare and Submit Final Basis of Design Report	2		2		16			1	\$ 50	\$ 2,480
	Task Subtotal (Hours) = 63	6	0	8	10	32	0	2	5		
	Task Subtotal (Fees)	\$ 1,350	\$ -	\$ 1,280	\$ 1,200	\$ 3,200	\$ -	\$ 200	\$ 300	\$ 100	\$ 7,630
7	Bid Process Support										
7.1	Bidding Support (pre-bid, comments eval., bid eval.)	12		12	32	40			24		\$ 13,900
	Task Subtotal (Hours) = 120	12	0	12	32	40	0	0	24		
	Task Subtotal (Fees)	\$ 2,700	\$ -	\$ 1,920	\$ 3,840	\$ 4,000	\$ -	\$ -	\$ 1,440	\$ -	\$ 13,900
8	Project Management										
8.1	Weekly Reporting & Coordination (12 wks.)	16		16	16	16			8		\$ 10,160
8.2	Schedule Support			16		16					\$ 4,160
8.3	Misc. Project Meetings (3 assumed)	48		48		48			4	\$ 1,917	\$ 25,437
8.4	Phase 3 Scoping	4		16		4			4		\$ 4,100
	Task Subtotal (Hours) = 280	68	0	96	16	84	0	0	16		
	Task Subtotal (Fees)	\$ 15,300	\$ -	\$ 15,360	\$ 1,920	\$ 8,400	\$ -	\$ -	\$ 960	\$ 1,917	\$ 43,857
	Project Total (Hours) = 1269	180	8	228	212	420	40	92	89		
	Project Total (Fees)	\$ 40,500	\$ 1,640	\$ 36,480	\$ 25,440	\$ 42,000	\$ 5,200	\$ 9,200	\$ 5,340	\$ 6,597	\$ 172,397

		Principal Engineer	Associate Engineer	Sr. Engineer/ Project Manager	Senior Project Engineer	Project Engineer	Senior Enviro. Scientist	Design CADD/GIS	Steno-graphic Services	Expenses
Task No.	Item Description	\$ 225.00	\$ 205.00	\$ 160.00	\$ 120.00	\$ 100.00	\$ 130.00	\$ 100.00	\$ 60.00	Derivation Follows

Expense Fee Estimate Derivation

Item No.	Item Description	Quantity	Unit	Unit Price	Cost
1.2	Project Kick-Off Meeting				
	Vehicle Mileage	500	miles	\$ 0.35	\$ 175.00
	Per-Diem - Meals & Lodging (\$116 per person per day)	8	man-days	\$ 116.00	\$ 928.00
	Subtotal				\$ 1,103.00
2.5	Draft 95% IFR Review Meeting with TVA				
	Vehicle Mileage	500	miles	\$ 0.35	\$ 175.00
	Per-Diem - Meals & Lodging (\$116 per person per day)	8	man-days	\$ 116.00	\$ 928.00
	Subtotal				\$ 1,103.00
2.10	Final 100% IFC Review Meeting with TVA				
	Vehicle Mileage	500	miles	\$ 0.35	\$ 175.00
	Per-Diem - Meals & Lodging (\$116 per person per day)	6	man-days	\$ 116.00	\$ 696.00
	Subtotal				\$ 871.00
4.6	Construction Review Meeting with TVA				
	Vehicle Mileage	500	miles	\$ 0.35	\$ 175.00
	Per-Diem - Meals & Lodging (\$116 per person per day)	8	man-days	\$ 116.00	\$ 928.00
	Subtotal				\$ 1,103.00
7	Project Management				
	Vehicle Mileage	1500	miles	\$ 0.35	\$ 525.00
	Per-Diem - Meals & Lodging (\$116 per person per day)	12	man-days	\$ 116.00	\$ 1,392.00
	Subtotal				\$ 1,917.00

* - Note Report Deliverables include incidental copying and shipping charge estimate of \$50.

Client Tennessee Valley Authority
 Project Name North Drainage Culvert
 Location New Johnsonville, Humphreys County, Tennessee
 Facility Johnsonville Fossil Plant
 Date February 14, 2014
 Project No. TVA No. 601939

Prepared By MAT
 Reviewed By _____



Fee Estimate - Phase 3 (Construction Implementation)

Labor Fee Estimate Derivation & Task Totals

		Principal Engineer	Associate Engineer	Sr. Engineer/ Project Manager	Senior Project Engineer	Project Engineer	Sr. Eng. Technician	Eng. Technician	Design CADD/GIS	Steno-graphic Services	Expenses	
Task No.	Item Description	\$ 225.00	\$ 205.00	\$ 160.00	\$ 120.00	\$ 100.00	\$ 90.00	\$ 70.00	\$ 100.00	\$ 60.00	Derivation Follows	
1	Pre-Construction Activities											
1.1	Pre-Construction Meeting	16		16	16		16			2	\$ 3,348	\$ 12,988
	Task Subtotal (Hours) = 66	16	0	16	16	0	16	0	0	2		
	Task Subtotal (Fees)	\$ 3,600	\$ -	\$ 2,560	\$ 1,920	\$ -	\$ 1,440	\$ -	\$ -	\$ 120	\$ 3,348	\$ 12,988
2	Construction Observation and Design Support											
2.1	Construction Observation (13 wks.)						650				\$ 9,480	\$ 67,980
2.2	Weekly Progress Meetings (13 wks.)			208						8	\$ 928	\$ 34,688
2.3	Site Visits (4 assumed)			64		64				8	\$ 2,048	\$ 19,168
2.4	Daily Reports			6	8	66				60		\$ 12,120
2.5	Review Contractor Submittals and Process Requests for Information	2	4	12		24				8		\$ 6,070
2.6	SWPPP Coordination & Reporting			2	4	12				2		\$ 2,120
	Task Subtotal (Hours) = 1212	2	4	292	12	166	650	0	0	86		
	Task Subtotal (Fees)	\$ 450	\$ 820	\$ 46,720	\$ 1,440	\$ 16,600	\$ 58,500	\$ -	\$ -	\$ 5,160	\$ 12,456	\$ 142,146
3	Record Drawings											
3.1	Prepare and Submit Record Drawings	8	4	12	16	32			120		\$ 50	\$ 21,710
	Task Subtotal (Hours) = 208	8	4	12	16	32	16	0	120	0		
	Task Subtotal (Fees)	\$ 1,800	\$ 820	\$ 1,920	\$ 1,920	\$ 3,200	\$ 1,440	\$ -	\$ 12,000	\$ -	\$ 50	\$ 23,150

TVA CONFIDENTIAL INFORMATION

Stantec Consulting Services Inc.

		Principal Engineer	Associate Engineer	Sr. Engineer/ Project Manager	Senior Project Engineer	Project Engineer	Sr. Eng. Technician	Eng. Technician	Design CADD/GIS	Steno-graphic Services	Expenses	
Task No.	Item Description	\$ 225.00	\$ 205.00	\$ 160.00	\$ 120.00	\$ 100.00	\$ 90.00	\$ 70.00	\$ 100.00	\$ 60.00	Derivation Follows	
4	Construction Certification Report (CCR)											
4.1	Prepare and Submit Draft CCR	2		8		24				2	\$ 50	\$ 4,300
4.2	Draft CCR Review Meeting with TVA	16		16		16				2	\$ 906	\$ 8,786
4.3	Prepare and Submit Final CCR	2		4		8				1	\$ 50	\$ 2,000
	Task Subtotal (Hours) = 117	20	0	28	0	48	16	0	0	5		
	Task Subtotal (Fees)	\$ 4,500	\$ -	\$ 4,480	\$ -	\$ 4,800	\$ 1,440	\$ -	\$ -	\$ 300	\$ 1,006	\$ 16,526
5	Project Management											
5.1	Weekly Reporting & Coordination (13 wks.)	14		14	14	14	28					\$ 10,990
5.2	Schedule Support			14		14						\$ 3,640
5.3	Misc. Project Meetings (2 assumed)	32		32		32	32			4	\$ 2,276	\$ 20,916
	Task Subtotal (Hours) = 244	46	0	60	14	60	60	0	0	4		
	Task Subtotal (Fees)	\$ 10,350	\$ -	\$ 9,600	\$ 1,680	\$ 6,000	\$ 5,400	\$ -	\$ -	\$ 240	\$ 2,276	\$ 35,546
	Project Total (Hours) = 1847	92	8	408	58	306	758	0	120	97		
	Project Total (Fees)	\$ 20,700	\$ 1,640	\$ 65,280	\$ 6,960	\$ 30,600	\$ 68,220	\$ -	\$ 12,000	\$ 5,820	\$ 19,136	\$ 230,356

		Principal Engineer	Associate Engineer	Sr. Engineer/ Project Manager	Senior Project Engineer	Project Engineer	Sr. Eng. Technician	Eng. Technician	Design CADD/GIS	Steno-graphic Services	Expenses
Task No.	Item Description	\$ 225.00	\$ 205.00	\$ 160.00	\$ 120.00	\$ 100.00	\$ 90.00	\$ 70.00	\$ 100.00	\$ 60.00	Derivation Follows

Expense Fee Estimate Derivation

Item No.	Item Description	Quantity	Unit	Unit Price	Cost
1.1.	Pre-Construction Meeting				
	Vehicle Mileage	1200	miles	\$ 0.35	\$ 420.00
	Per-Diem - Meals & Lodging (\$116 per person per day)	8	man-days	\$ 116.00	\$ 928.00
	Printing, Copies	1	lump sum	\$ 2,000.00	\$ 2,000.00
	Subtotal				\$ 3,348.00
2.1	Construction Observation (13 wks.)				
	Vehicle Mileage	7200	miles	\$ 0.35	\$ 2,520.00
	Per-Diem - Meals & Lodging (\$116 per person per day)	60	man-days	\$ 116.00	\$ 6,960.00
	Subtotal				\$ 9,480.00
2.2	Weekly Progress Meetings (13 wks.)				
	Vehicle Mileage	7800	miles	\$ 0.35	\$ 2,730.00
	Per-Diem - Meals & Lodging (\$116 per person per day)	13	man-days	\$ 116.00	\$ 1,508.00
	Subtotal				\$ 4,238.00
2.3	Site Visits (4 assumed)				
	Vehicle Mileage	3200	miles	\$ 0.35	\$ 1,120.00
	Per-Diem - Meals & Lodging (\$116 per person per day)	8	man-days	\$ 116.00	\$ 928.00
	Subtotal				\$ 2,048.00
4.2.	Draft CCR Review Meeting with TVA				
	Vehicle Mileage	600	miles	\$ 0.35	\$ 210.00
	Per-Diem - Meals & Lodging (\$116 per person per day)	6	man-days	\$ 116.00	\$ 696.00
	Subtotal				\$ 906.00
5.3.	Misc. Project Meetings (2 assumed)				
	Vehicle Mileage	1200	miles	\$ 0.35	\$ 420.00
	Per-Diem - Meals & Lodging (\$116 per person per day)	16	man-days	\$ 116.00	\$ 1,856.00
	Subtotal				\$ 2,276.00

* - Note Report Deliverables include incidental copying and shipping charge estimate of \$50.

Proposals for the Cap Installation (TVA Project ID 605790) and the Rock Buttressing (TVA Project ID 605792) have not been approved by TVA, therefore the budgets, cash flow, and schedules have not been finalized.

Attachment F

Monthly Cash Flow

TVA CONFIDENTIAL INFORMATION

Monthly Cash Flow

Tennessee Valley Authority
North Drainage Culvert Project
Johnsonville Fossil Plant

	March-2014	April-2014	May-2014	June-2014	July-2014	August-2014	September-2014	October-2014	Total
Phase 2 Engineering Design and Permitting Support									
Task 1 - Project Set-Up, Project Plan & Kick-Off Meeting	\$ 12,643								\$ 12,643.00
Task 2 - Design and Analysis	\$ 8,979	\$ 5,051							\$ 14,030.00
Task 3 - Preparation of Plans and Specifications	\$ 4,400	\$ 19,248	\$ 19,798	\$ 11,549					\$ 54,994.00
Task 4 - Permitting Support	\$ 507	\$ 1,567	\$ 1,614	\$ 922					\$ 4,610.00
Task 5 - Construction QA and Contingency Plans			\$ 13,269	\$ 7,464					\$ 20,733.00
Task 6 - Basis of Design Report			\$ 4,883	\$ 2,747					\$ 7,630.00
Task 7 - Bid Process Support				\$ 13,900					\$ 13,900.00
Task 8 - Progress Meetings, Scheduling & Project Management	\$ 4,298	\$ 12,894	\$ 13,333	\$ 13,333					\$ 43,857.00
Phase 3 Construction Oversight and Engineering Support									
Pre-Construction Activities					\$ 12,988				\$ 12,988.00
Construction Review, Daily Reports, QC Tests					\$ 47,382	\$ 47,382	\$ 47,382		\$ 142,146.00
Design Support During Construction, Site Meetings					\$ 7,717	\$ 7,717	\$ 7,717		\$ 23,150.00
Closure Report, As-Built Drawings, Project Close-Out							\$ 8,263	\$ 8,263	\$ 16,526.00
Project Administration					\$ 11,849	\$ 11,849	\$ 11,849		\$ 35,546.00
Total	\$ 30,826.81	\$ 38,760.06	\$ 52,896.19	\$ 49,913.95	\$ 79,935.33	\$ 66,947.33	\$ 75,210.33	\$ 8,263.00	\$ 402,753.00

TVA CONFIDENTIAL INFORMATION

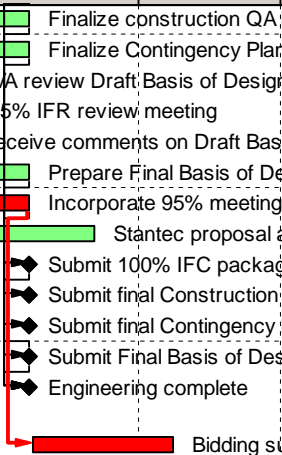
Proposals for the Cap Installation (TVA Project ID 605790) and the Rock Buttressing (TVA Project ID 605792) have not been approved by TVA, therefore the budgets, cash flow, and schedules have not been finalized.

Attachment G
Schedule

601939-STN JOF-Ash Disposal Area No 1(601939) (402782)															
Activity ID	Project ID	Activity Name	Orig Dur	Total Float	Start	Finish	Predecessors	Successors	2014						
									Feb	Mar	Apr	May	Jun	Jul	Aug
Study			176d	-10d	24-Jun-13 A	07-Mar-14									
Project Closure			20d	0d	12-Nov-14	10-Dec-14									
No Phase			99d	0d	21-Mar-14	08-Aug-14									
A1000	601939-STN	Project administration activities	5d	0d	21-Mar-14	27-Mar-14	STN-20001	A1010							
A1150	601939-STN	Coordination and support TVA environmental department	76d	23d	21-Mar-14	08-Jul-14	STN-20001	STN-20009							
A1230	601939-STN	Weekly reporting and coordination	76d	23d	21-Mar-14	08-Jul-14	STN-20001	STN-20009							
STN-20001	601939-STN	NTP	0d	0d	21-Mar-14*			A1000, A1150, A1230							
A1010	601939-STN	Project kick off meeting	1d	0d	28-Mar-14	28-Mar-14	A1000	A1020, A1040, A1030, A1050, A1290, A1300, A1310, A1320, A1060							
A1020	601939-STN	Revise and submit TVA record drawings	22d	71d	31-Mar-14	29-Apr-14	A1010								
A1030	601939-STN	TVA conduct survey and mapping	30d	63d	31-Mar-14	09-May-14	A1010	A1280							
A1040	601939-STN	Perform borrow materials evaluation	25d	68d	31-Mar-14	02-May-14	A1010	A1330							
A1050	601939-STN	Perform seepage and slope stability analysis	30d	63d	31-Mar-14	09-May-14	A1010	A1330							
A1060	601939-STN	Prepare 60% plans and specifications	27d	0d	31-Mar-14	06-May-14	A1010	A1080, A1400							
A1290	601939-STN	Perform sediment stabilization assessment	30d	63d	31-Mar-14	09-May-14	A1010	A1330							
A1300	601939-STN	Perform cap system analysis and design	30d	63d	31-Mar-14	09-May-14	A1010	A1330							
A1310	601939-STN	Perform hydrologic and hydraulic analysis	30d	63d	31-Mar-14	09-May-14	A1010	A1330							
A1320	601939-STN	Develop calculation package	30d	63d	31-Mar-14	09-May-14	A1010	A1330							
A1400	601939-STN	Prepare Draft SWPPP (Rev B)	25d	47d	09-Apr-14	13-May-14	A1060	A1410							
A1080	601939-STN	ITR 60% plans and specifications	5d	0d	07-May-14	13-May-14	A1060	A1340							
A1280	601939-STN	TVA provide survey results	0d	63d		09-May-14	A1030								
A1330	601939-STN	Complete analysis and design	0d	63d		09-May-14	A1040, A1050, A1290, A1300, A1310, A1320								
A1340	601939-STN	Submit 60% package to TVA	0d	0d		13-May-14	A1080	A1350							
A1410	601939-STN	Submit draft SWPPP (Rev B)	0d	47d		13-May-14	A1400	A1420							
A1350	601939-STN	TVA review 60% design	5d	0d	14-May-14	20-May-14	A1340	A1090							
A1420	601939-STN	TVA review Draft SWPPP (Rev B)	5d	47d	14-May-14	20-May-14	A1410	A1430							
A1430	601939-STN	Receive comments from TVA on Draft SWPPP (Rev B)	0d	47d		20-May-14	A1420	A1440							
A1090	601939-STN	Draft 60% IFR review meeting with TVA	2d	0d	21-May-14	22-May-14	A1350	A1100, A1130, A1200, A1160, A1170							
A1440	601939-STN	Incorporate comments from Draft SWPPP (Rev B)	9d	47d	21-May-14	03-Jun-14	A1430	A1450							
A1100	601939-STN	Prepare 95% IFR package	11d	0d	23-May-14	09-Jun-14	A1090	A1360							
A1160	601939-STN	Prepare Construction QA Plan (Rev A)	11d	23d	23-May-14	09-Jun-14	A1090	A1460							
A1170	601939-STN	Prepare Contingency Plan (Rev A)	11d	23d	23-May-14	09-Jun-14	A1090	A1500							
A1200	601939-STN	Prepare Draft Basis of Design report	16d	23d	23-May-14	16-Jun-14	A1090	A1550							
A1450	601939-STN	Submit Final SWPPP (Rev 0)	0d	47d		03-Jun-14	A1440								
A1130	601939-STN	Prepare updated construction cost opinion	5d	0d	09-Jun-14	13-Jun-14	A1090	A1360							
A1460	601939-STN	Submit Construction QA Plan (Rev A)	0d	23d		09-Jun-14	A1160	A1470							
A1500	601939-STN	Submit Contingency Plan (Rev A)	0d	23d		09-Jun-14	A1170	A1510							
A1360	601939-STN	ITR 95% IFR package	4d	0d	10-Jun-14	13-Jun-14	A1100, A1130	A1370							
A1470	601939-STN	TVA review Construction QA Plan (Rev A)	5d	23d	10-Jun-14	16-Jun-14	A1460	A1480							
A1510	601939-STN	TVA review Contingency Plan (Rev A)	5d	23d	10-Jun-14	16-Jun-14	A1500	A1520							
A1370	601939-STN	Submit 95% IFR package to TVA	0d	0d		13-Jun-14	A1360	A1380							
A1380	601939-STN	TVA review 95% IFR package	5d	0d	16-Jun-14	20-Jun-14	A1370	A1110							
A1480	601939-STN	Recieve comments from TVA on QA Plan (Rev A)	0d	23d		16-Jun-14	A1470	A1180							
A1520	601939-STN	Recieve comments from TVA on Contingency Plan (Rev A)	0d	23d		16-Jun-14	A1510	A1530							
A1550	601939-STN	Submit Draft Basis of Design report	0d	23d		16-Jun-14	A1200	A1560							
Remaining Level of Effort			Page 1 of 2						Data Date:01-Mar-14						
Actual Level of Effort			Layout: Execution Schedule (phase)						Print Date:03-Mar-14						
Critical Remaining Work															
Remaining Work															
Milestone															

601939-STN JOF-Ash Disposal Area No 1(601939) (402782)

Activity ID	Project ID	Activity Name	Orig Dur	Total Float	Start	Finish	Predecessors	Successors	2014						
									Feb	Mar	Apr	May	Jun	Jul	Aug
A1180	601939-STN	Finalize construction QA Plan (Rev 0)	15d	23d	17-Jun-14	08-Jul-14	A1480	A1490							
A1530	601939-STN	Finalize Contingency Plan (Rev 0)	15d	23d	17-Jun-14	08-Jul-14	A1520	A1540							
A1560	601939-STN	TVA review Draft Basis of Design report	5d	23d	17-Jun-14	23-Jun-14	A1550	A1570							
A1110	601939-STN	95% IFR review meeting	3d	0d	23-Jun-14	25-Jun-14	A1380	A1140, A1260							
A1570	601939-STN	Receive comments on Draft Basis of Design report	0d	23d		23-Jun-14	A1560	A1210							
A1210	601939-STN	Prepare Final Basis of Design report	10d	23d	24-Jun-14	08-Jul-14	A1570	A1580							
A1140	601939-STN	Incorporate 95% meeting comments	8d	0d	26-Jun-14	08-Jul-14	A1110	A1390, A1220							
A1260	601939-STN	Stantec proposal and scope of services for phase 3	18d	13d	26-Jun-14	22-Jul-14	A1110								
A1390	601939-STN	Submit 100% IFC package	0d	23d		08-Jul-14	A1140, A1580	STN-20009							
A1490	601939-STN	Submit final Construction QA Plan (Rev 0)	0d	23d		08-Jul-14	A1180								
A1540	601939-STN	Submit final Contingency Plan (Rev 0)	0d	23d		08-Jul-14	A1530								
A1580	601939-STN	Submit Final Basis of Design report	0d	23d		08-Jul-14	A1210	A1390, STN-20009							
STN-20009	601939-STN	Engineering complete	0d	23d		08-Jul-14	A1390, A1580, A1230, A1150								
A1220	601939-STN	Bidding support	23d	0d	09-Jul-14	08-Aug-14	A1140								



Remaining Level of Effort Actual Work Critical Remaining Work
Actual Level of Effort Remaining Work Milestone Milestone

Proposals for the Cap Installation (TVA Project ID 605790) and the Rock Buttressing (TVA Project ID 605792) have not been approved by TVA, therefore the budgets, cash flow, and schedules have not been finalized.

Attachment H

Facility Exclusion Criteria

**North Drainage Culvert (TVA Project ID 601939),
Cap Installation (TVA Project ID 605790) &
Rock Buttrressing (TVA Project ID 605792)
Closure Design Checklist
General Design and Storm Water**

1. Dewatering

- a. Identify type of outlet works and list any previous issues, deficiencies, maintenance, modifications, etc.

A 36" plastic pipe allows runoff to discharge through the dike. A CCTV inspection conducted in January 2014 shows that the pipe has numerous defects and is failing. No other outlet works are present. No pond or permanent pool is present upstream of the outlet.

- b. Record drawings available Y X N _____

- i. If available, list drawing reference numbers and attach drawings:

10H443 R1, 10H515 R0, 10H516 R0, 10H517 R0, 10H518 R0, 10H519 R0

- ii. If not available, perform field survey, list drawing reference numbers and attach drawings:

- c. Describe proposed methods for dewatering pond and steps taken to prevent sudden loss of pool:

N/A—No pond or permanent pool is present

- d. Special lifting equipment required
(Cranes, helicopters, etc.)

Y _____ N X

- i. If yes, what special concerns and precautions are to be considered during final design (stability, safety, etc.):

N/A—No pond or permanent pool is present

e. Determine maximum drawdown rate:

i. Preliminary Planning: 6-inches per day; no more than 2 feet / week

ii. Final Design (Attach support calculations):

Rapid Drawdown Analysis Performed: Y _____ N _____

Minimum Slope Stability $FS \geq 1.3$ Y _____ N _____

f. Permit and Operational Considerations:

i. Identify and attach relative conditions from NPDES permit:

The applicable permit is NPDES Permit No. TN0005444.

ii. Identify any water quantity limits to be maintained during pond dewatering:

N/A—No pond or permanent pool is present, no pond dewatering will be completed.

iii. Identify any water quality limits to be maintained during pond dewatering:

N/A—No pond or permanent pool is present, no pond dewatering will be completed

iv. Identify any other permit concerns associated with pond dewatering (fugitive dust, etc.)

N/A—No pond or permanent pool is present, no pond dewatering will be completed

v. Describe methods that will be employed to ensure permit limits are maintained (baffles, check dams, curtains, etc.):

N/A—No pond or permanent pool is present, no pond dewatering will be completed

vi. Attach supporting documents, calculations, etc.:

N/A—No pond or permanent pool is present, no pond dewatering will be completed

2. Geometry and Grading

a. Exterior Side Slopes:

- i. Existing Maximum Slope: 2.5 Horizontal – to – 1 Vertical (H:V)
Source of Information: (Aerial Mapping, Field Survey, etc.)

Slopes identified are exterior side slopes for the dike. Data source is the "Typical Section"

detail on TVA Record Drawing 10H443 R1

(Attach information source and calculations)

- ii. Design Maximum Slope 2.5 H: 1 V
(Suggested Max - 3H:1V)

Basis:

Permit Requirements (Attach permit condition or reference)

Regulation – List Regulation(s)

Regulatory Agency Preference

Global or Local Stability (Attach Calculations)

Veneer (cap) Stability (Attach Calculations)

X	Other	Existing exterior side slopes will be maintained.
---	-------	---

b. Crest Slopes:

- i. Existing Maximum Slope: **5** percent

Source of Information: (Aerial Mapping, Field Survey, etc.)

Crest slope identified is the cross slope for the existing dike. Data source is the "Typical

Section" detail on TVA Record Drawing 10H443 R1.

(Attach information source and calculations)

- ii. Design Minimum Slope 2 Percent
(Suggested Min - 2 percent - post settlement)

Basis:

Activity	Permit Requirements (Attach permit condition or reference)
1. Site Preparation	
1.1 Clearing and Grading	
1.1.1 Site Clearing	
1.1.2 Grading and Erosion Control	
1.2 Foundation Work	
1.2.1 Excavation	
1.2.2 Foundation Construction	
2. Structural Construction	
2.1 Framing	
2.2 Roofing	
2.3 Exterior Finishes	
2.4 Interior Finishes	
3. Mechanical, Electrical, and Plumbing (MEP)	
3.1 Mechanical	
3.2 Electrical	
3.3 Plumbing	
4. Final Inspection and Occupancy	

Regulation – List Regulation(s)

Regulatory Agency Preference

X	Other	To promote positive drainage and reduce the potential for ponding.
---	-------	--

- iii. Maximum Overland Spacing of Drainage Feature 300 feet

(Suggested Max – 300 feet)

(Features include swales, ditches berms, etc.)

Basis:

- _____ Permit Requirements (Attach permit condition or reference)
- _____ Regulation – List Regulation(s) _____
- _____ Regulatory Agency Preference
- X Other To reduce the potential for unintended flow concentration.

c. Slope Benches

- i. Vertical Spacing N/A feet

(Suggested Max – 30 to 40 feet)

Basis:

- _____ Match Existing Conditions
- _____ Permit Requirements (Attach permit condition or reference)
- _____ Regulation – List Regulation(s) _____
- _____ Regulatory Agency Preference
- _____ Other _____

- ii. Width N/A feet

(Suggested Min – 10 feet)

Basis:

- _____ Match Existing Conditions
- _____ Permit Requirements (Attach permit condition or reference)
- _____ Regulation – List Regulation(s) _____
- _____ Regulatory Agency Preference
- _____ Other _____

- iii. If benches are used for drainage purposes provide:

Cross Slope: _____ Percent *(Suggested 2 – 10 percent)*

Longitudinal Slope: _____ Percent *(Suggested 2 – 3 percent)*

Dropdown/Surface Inlet Max Spacing: _____ Percent *(Suggested 500 feet)*
(Attach calculations demonstrating adequate freeboard, velocities, etc.)

3. Drainage

a. Final Design

i. Design Storm

 X 100 Year, 24-Hour Precipitation Event
 Other (*Describe and Provide Justification*)

ii. Rainfall Depth: 8.17 inches

 X Source – NOAA Atlas 14
 Other (*Identify Reference and Provide Justification*)

iii. Peak Runoff

 X NRCS Technical Release No. 55 (TR-55)
 Other (*Identify Reference and Provide Justification*)

iv. Freeboard

 X \geq EGL and \geq 1ft
 Other (*Describe and Provide Justification*)

b. Interim Conditions (Construction):

Drainage Features	Design Storm	Rainfall Depth (in)	Risk of CCP Release (y/n)

Note: 100 Year, 24-Hour design storm suggest for all drainage features at risk for CCP release

c. Provide other comments or clarifications relative to drainage design:

Interim conditions will be evaluated during the Phase 2 effort.

4. Cap System

a. Functional Performance Criteria

- i. Cap components prescribed by regulations: Y ____ N X

If yes, provide reference and describe components:

- ii. Cap components possibly impacted by pending regulations: Y ____ N X

If yes, provide reference and describe components:

Coal combustion residuals are currently considered exempt wastes under an amendment to the Resource Conservation and Recovery Act (RCRA), but may become subject to regulation under RCRA Subtitle C (special wastes) or RCRA Subtitle D (non-hazardous wastes).

- iii. Describe functional performance requirements and methods of evaluating design:

Permeability/Infiltration: Permeability of the cap system will be less than or equal to the maximum permeability of the underlying materials. The cap system will be evaluated using common engineering practices to determine permeability and infiltration values.

Maintenance: The approved final contours and drainage systems of the site will be maintained such that erosion of the cover is minimized, precipitation on the fill is controlled and directed off the closure area, and ponding is minimized. TVA will establish a regular inspection and maintenance schedule for post-closure care activities.

Drainage: The cover soil above the cap will be sloped to drain storm water runoff and to reduce the potential for ponding on top of the cap. The geosynthetic cap system will be sloped to drain water that infiltrates through the cover soil to an outlet.

Other:

Other: _____

b. Cap Components (top to bottom)

i. Cover Soil Y X N/A _____

Required Material Properties:

Soil Classification

X CL or CH (USCS)

_____ Other (*Identify and Provide Justification*)

Thickness:

6 Inches – vegetative layer

18 Inches – protective layer

Other (*Maximum Particle Size, Amendments, etc.*)

ii. Drainage Layer Y X N/A _____

Material

_____ Soil

_____ Granular

X Other (*Identify and Provide Justification*)

Properties (*Thickness, gradation, permeability, transmissivity, etc.*)

A drainage layer consisting of a double-sided geocomposite will be specified.

Hydraulic Capacity

☒ Capacity \geq 2x Inflow☐ Other (Define and Provide Justification)**Calculations will be provided in Phase 2.***(Attach calculations demonstrating adequate capacity and proper spacing of inlets)*iii. Low Permeable Layer Y ☒ N/A ☐

Material

☐ Soil☐ Texturing required (geosynthetics)☒ Geosynthetic *(Define)**Properties (Thickness, gradation, permeability, transmissivity, etc.)***A 40 mil LLDPE geomembrane will be specified.***(See Section 4 for veneer slope stability calculations)**(Attach calculations demonstrating the cap system meets the functional performance criteria as appropriate)*

5. Roadways

a. Types and Design Considerations

i. Access Road Y ☐ N ☒

Vehicle Types

Traffic Volume:

Design Speed:

Traffic Pattern (one way or two way):

Typical Width: One-way _____ ft Two-way _____ ft

Cross Slopes: _____ % (typical 2% to 4%)

ii. Service/Security Road _____ Y X N

Vehicle Types _____

Traffic Volume: _____

Design Speed: _____

Traffic Pattern (one-way or two-way): _____

Typical Width: One-way _____ ft Two-way _____ ft

Cross Slopes: _____ % (typical 2% to 4%)

b. Geometry

_____ Geometric layout and design follow AASHTO "geometric Design of Highways and Streets", latest edition.

_____ Other (*Describe Methodology and Justifications*)

N/A

c. Safety

_____ Guardrail or Earthen Berms Required (*Identify Locations*)

N/A

_____ Other Safety Features Required (*Identify*)

N/A